VOL. 48 APRIL, 1922 No. 230

Engineering Library

United States Naval Institute

Proceedings

The writers only are responsible for the contents of their respective articles

CONTENTS

	PAGE
Rigid Airships in the United States Navy.—Pennoyer	517
The Naval War.—Voitoux	531
The Strategy Department of the War College.—Belknap	547
A Fighting Leader for the Fleet.—Turner	561
Naval Regulations.—Yarnell	577
American and British Destroyers.—Chandler	585
Co-ordination in Army and Navy Training.—Williams	593
A Plea in Defense of Paper-Work.—Carmine	621
Discussion	633
Secretary's Notes	641
Professional Notes	645
Notes on International Affairs	681
Book Reviews	689
Information Index	643

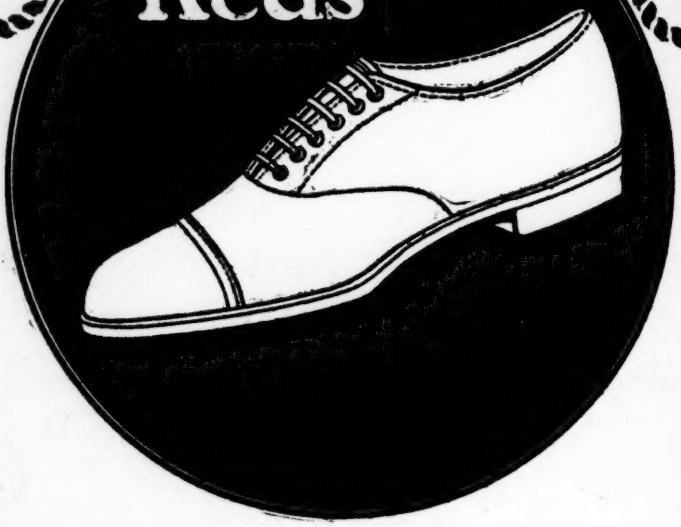
Copyright, 1922, by J. W. Conroy, Trustee for U. S. Naval Institute

Published monthly by the U. S. Naval Institute, at 450 Ahnaip St., Menasha, Wis.

Executive and Editorial Offices, United States Naval Institute, Annapolis, Md.

Application pending for transfer of second-class entry from Annapolis, Md., to Menasha, Wis.

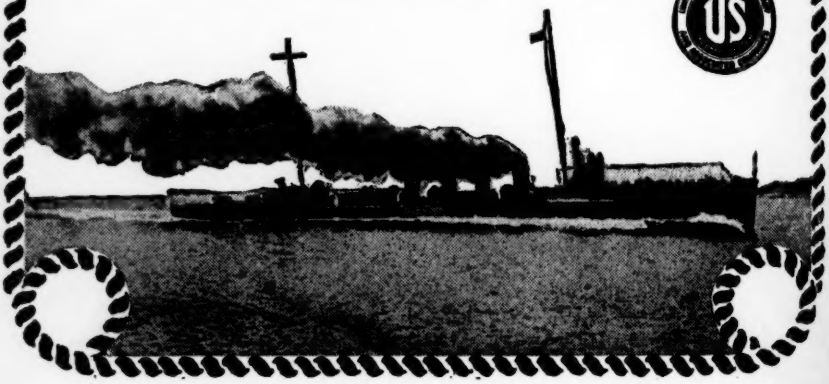
Keds



MATCH your "whites" with Keds, the superior canvas rubber-soled shoes. Cool and comfortable, neat and durable, Keds are the ideal summer and tropical footwear for men of the Navy.

United States Rubber Company

US



Vol. 48, No. 4 April, 1922 Whole No. 230

United States Naval Institute

Proceedings

PUBLISHED MONTHLY
EDITED BY F. M. ROBINSON

U. S. NAVAL INSTITUTE
ANNAPOLIS — MARYLAND

COPYRIGHT, 1922
By J. W. CONROY
TRUSTEE FOR U. S. NAVAL INSTITUTE

The Collegiate Press
GEORGE BANTA PUBLISHING CO.
MENASHA, WIS.

The writers only are responsible for the contents of their respective articles

CONTENTS

RIGID AIRSHIPS IN THE UNITED STATES NAVY. By Lieutenant R. S. Pennoyer, U. S. Navy 517

THE NAVAL WAR. By Captain Gabriel Voitoux, French Navy 531

THE STRATEGY DEPARTMENT OF THE WAR COLLEGE. By Captain Reginald R. Belknap, U. S. Navy 547

A FIGHTING LEADER FOR THE FLEET. By Lieut. Commander R. K. Turner, U. S. Navy 561

NAVAL REGULATIONS. By Captain H. E. Yarnell, U. S. Navy 577

AMERICAN AND BRITISH DESTROYERS. By Lieut. T. E. Chandler, U. S. Navy 585

CO-ORDINATION IN ARMY AND NAVY TRAINING. By Colonel Dion Williams, U. S. M. C. 593

A PLEA IN DEFENSE OF PAPER-WORK. By Lieut. C. C. Carmine, U. S. Navy 621

DISCUSSION 633

SECRETARY'S NOTES 641

PROFESSIONAL NOTES 645

NOTES ON INTERNATIONAL AFFAIRS 681

BOOK REVIEWS 689

OFFICERS OF THE INSTITUTE

President

REAR ADMIRAL BRADLEY A. FISKE, U. S. NAVY

Vice President

REAR ADMIRAL HENRY B. WILSON, U. S. NAVY

Secretary and Treasurer

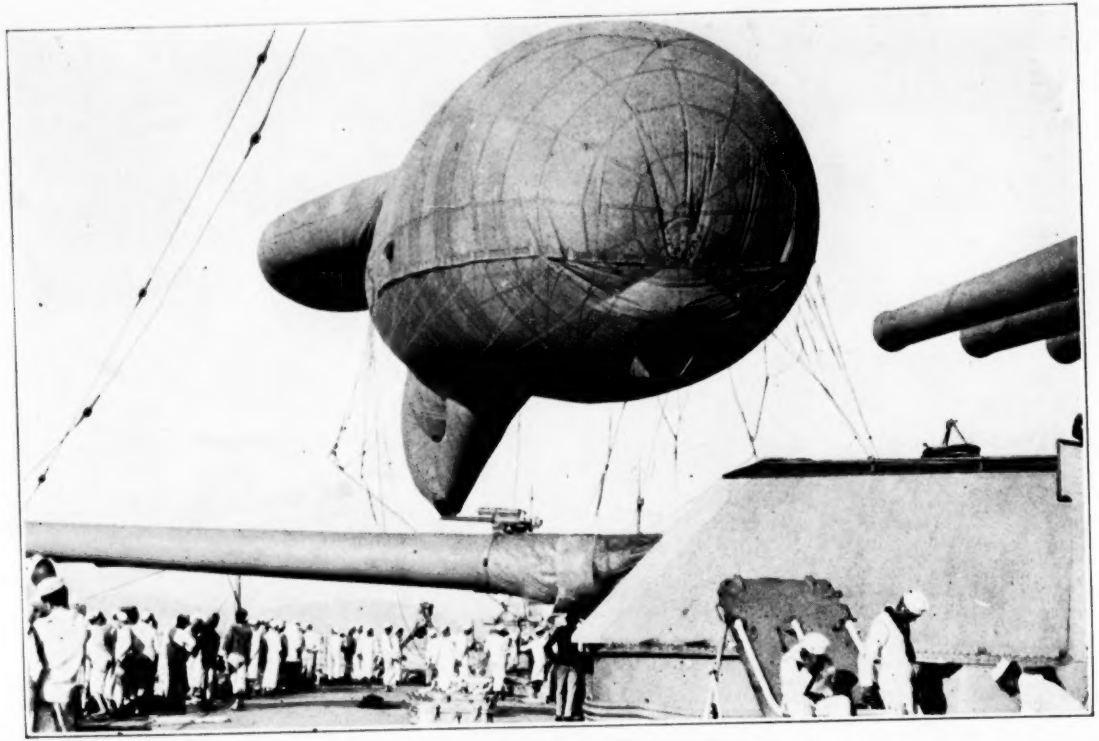
LIEUT. COMMANDER F. M. ROBINSON, U. S. NAVY

Board of Control

REAR ADMIRAL BRADLEY A. FISKE, U. S. NAVY (*ex officio*)
REAR ADMIRAL HENRY B. WILSON, U. S. NAVY (*ex officio*)
BRIGADIER GENERAL GEORGE RICHARDS, U. S. M. C.
CAPTAIN JOHN HALLIGAN, JR., U. S. NAVY
CAPTAIN J. A. FURER, (C. C.), U. S. NAVY
COMMANDER JOHN DOWNES, U. S. NAVY
COMMANDER J. O. RICHARDSON, U. S. NAVY
COMMANDER H. D. COOKE, U. S. NAVY
LIEUT. COMMANDER F. M. ROBINSON, U. S. NAVY (*ex officio*)

PAST PRESIDENTS

ADMIRAL DAVID D. PORTER, U. S. NAVY, 1873
REAR ADMIRAL JOHN L. WORDEN, U. S. NAVY, 1874
REAR ADMIRAL C. R. P. RODGERS, U. S. NAVY, JAN. 1875–JAN. 1878
COMMODORE FOXHALL A. PARKER, U. S. NAVY, JAN. 1878–JAN. 1879
REAR ADMIRAL JOHN RODGERS, U. S. NAVY, JAN. 1879–JAN. 1882
REAR ADMIRAL C. R. P. RODGERS, U. S. NAVY, JAN. 1882–JAN. 1883
REAR ADMIRAL THORNTON A. JENKINS, U. S. NAVY, JAN. 1883–OCT. 1885
REAR ADMIRAL EDWARD SIMPSON, U. S. NAVY, OCT. 1885–OCT. 1887
REAR ADMIRAL STEPHEN B. LUCE, U. S. NAVY, OCT. 1887–OCT. 1898
REAR ADMIRAL WM. T. SAMPSON, U. S. NAVY, OCT. 1898–OCT. 1902
REAR ADMIRAL H. C. TAYLOR, U. S. NAVY, OCT. 1902–OCT. 1904
REAR ADMIRAL C. F. GOODRICH, U. S. NAVY, OCT. 1904–OCT. 1909
REAR ADMIRAL RICHARD WAINWRIGHT, U. S. NAVY, OCT. 1909–OCT. 1911



KITE BALLOON, U. S. S. PENNSYLVANIA

UNITED STATES NAVAL INSTITUTE PROCEEDINGS

Vol. No. 48, No. 4 **APRIL, 1922** **Whole No. 230**

[COPYRIGHTED]

U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

RIGID AIRSHIPS IN THE UNITED STATES NAVY

By Lieutenant R. G. Pennoyer, U. S. N.

History

Since rigid airships undoubtedly will in the near future be attached to our fleet, it is believed that information concerning their general characteristics and possible sphere of usefulness to the fleet will be of interest to the service at large.

The first practical rigid airship was constructed by Count Von Zeppelin as early as the year 1900. This remarkable man was a German military observer with the Union forces during our own Civil War, and it will be remembered that it was during this war that a free balloon was released for the purpose of obtaining information for the first time in the history of human warfare. This was observed by Count Von Zeppelin, who realized how wonderful it would be if propelling machinery could be installed in a balloon so that it could be directed where desired. A few years later he watched with interest the development of the non-rigid and semi-rigid types of airships in France and became convinced that a rigid type was not only possible, but if successful would be a distinct improvement over the others. Accordingly Count Zeppelin employed two German engineers to assist him in the design of a rigid airship. His first ship was flown from Lake

Constance during the summer of 1900 and although a speed of only seventeen miles per hour was attained, the maneuverability was considered excellent and the ship a success. This ship was later destroyed by a storm, no housing facilities having been provided, but it was the large and rather healthy child which was the prototype of all that have since been brought forth in Germany and elsewhere. The Zeppelin, as these ships were popularly called by the German people after the designer, went through many vicissitudes and disasters due to lack of proper facilities for handling and housing and to lack of experience. At the outbreak of war in August, 1914, out of the twenty-six airships which had been built by the Germans fourteen had been destroyed from one cause or another, so that only twelve ships were available for military purposes. The size and power of these ships were considerably increased over the earlier ships, several having a capacity of nearly one million cubic feet and with almost a thousand horsepower, and a speed of fifty-five miles per hour.

In the early stages of the war, the Germans used these ships for raids on the English coast and industrial centers, and since the British had little or no defense to offer against them the moral and material effect was, contrary to general belief, exceedingly great, especially that of the raids directed against the industrial cities of the Midlands. The British Secret Service was excellent, and in almost all cases obtained advance warning of an intended raid, whereupon all blast furnaces would be closed down and fires banked so as not to give their position away at night to the enemy raiders. This closing down of blast furnaces in a city like Sheffield, which was turning out tremendous quantities of war materials, necessarily disrupted the organization and cut down the production of munitions which were sorely needed by the British army in the early part of the war. As the defences of these cities were perfected, these raids became less effective and were finally abandoned by the Germans, but not before a great many of these airships had been lost.

Rigid airship construction was not started in Great Britain until 1911, and nothing of any real importance was evolved until the Admiralty decided on a design similar to the German *L-33*, which was brought down in England almost intact during the year 1916. Orders for two of this class were placed in November,

1916, and were known as the *R-33* class. The famous *R-34*, which crossed the Atlantic and recrossed in July, 1919, was the second of this class. These two ships were not completed until May, 1919.

During the war the United States Navy Department saw the value of the rigid airship for naval use and the General Board recommended that this type of craft should be provided for the navy. In due course Congress appropriated funds for two ships, one to be built in the United States and the other to be purchased abroad.

In the month of October, 1919, the Navy Department instructed the Commander, U. S. Naval Forces Operating in European Waters, to enter into negotiations with the British Air Ministry for the purchase of the rigid airship *R-38*, which ship represented the latest design in airship development in Great Britain. These negotiations were completed to the mutual advantage of both parties. At the same time arrangements were made for the training of a U. S. naval crew for the ship.

The trials of the *R-38*, renamed the *ZR-2*, were conducted during the past summer, and it was during her last trial flight on August 24, 1921, that disaster overtook this airship, and the whole civilized world was stunned by the terrible catastrophe which took place near the city of Hull, England, resulting in the loss of forty-five of the forty-nine persons on board.

Many times I have been asked to state the cause of this accident and in passing it might be of interest to cover this point. The *ZR-2* was the largest airship that has ever been constructed and several distinct departures were made in the design. She was roughly of 300,000 cubic feet greater capacity than the *L-72*, the last and largest German rigid to be completed, and to obtain this volume the diameter was increased over that of the *L-72*.

During the construction of the ship various tests were given to ascertain if the structure would have the required strength, and on some of these tests it was found necessary to strengthen the hull structure.

On the third trial flight of this airship held on the seventeenth and eighteenth of July, when attempting to make full speed on four engines, the hull structure started to fracture in several places. The engines were immediately stopped and further

damage averted. She was then flown slowly back to her base and landed without further incident. A conference was held immediately after this flight, in which it was decided to strengthen the ship throughout the under side of the parallel body; that is, from frame four forward to frame nine aft. (The *ZR-2* had fifteen main frames.)

It was on the flight following the completion of this strengthening that the disaster occurred.

Various and sundry tests were to be carried out on this flight, the last test to be a rapid movement of the rudders in both directions. A full speed trial lasting about fifteen minutes had been conducted successfully, in which the ship attained a speed of over sixty knots. Shortly afterward, rudder trials were started with the ship's speed about fifty-four knots. During these tests the ship's structure failed between frames nine and ten (the strengthening was only carried back as far as frame nine) and completely separated into two parts. The gasoline leads were severed and a fire started in the after end of the forward portion almost at the moment of fracture. An explosion followed shortly after, causing the collapse of this portion, and as it struck the water a second explosion occurred.

The after portion descended slowly into the Humber River without catching on fire, and four of the five survivors were in this part.

From all the evidence it appears that this airship was weak structurally, and that the rapid movements of the rudders caused a strain which the structure could not stand, and the ship fractured aft of the portion which had been strengthened.

The construction of a rigid airship presents some very difficult problems in design, and some of the calculations involved are almost impossible of solution in the present state of the art. As with most design work, most calculations are based on past experience, and the experience is limited.

We must remember that rigid airships are very modern indeed, and the *ZR-2* was the largest rigid airship that had ever before been attempted. In many instances the designers were entering entirely new fields. In this connection naval constructors have been designing ships since the time of Noah, but even with the thousands of years of experience behind us, ships that sail the

seas sometimes prove to be structurally weak. Compare this experience with the very limited experience designers have had with rigid airships, and one marvels they have gone so far.

A GERMAN RIGID FOR THE UNITED STATES

In December, 1918, after the signing of the Armistice, a commission of aeronautical experts visited Germany and found a total of seven rigid airships intact in their hangars. These were subsequently assigned to the Allies as follows: two to England; two to France; two to Italy; and one to Japan.

In considering the allocation of these German rigid airships, the Supreme Council made a decision in September, 1919, that France and Great Britain should have a choice of the two best airships left in Germany, the choice to be exercised in the order named. (France chose the *L-72* and Great Britain the *L-71*, which were subsequently delivered.) The remaining rigid airships were to be distributed to the United States, Italy, Great Britain, France, Japan, and Belgium, each power to exercise one choice in alternate rotation.

In view of the fact that the United States did not ratify the Treaty of Versailles, she did not exercise her right of choice.

When the United States signed a separate treaty of peace with Germany, she reserved all the rights that might otherwise have accrued to her if she had been a signatory power at the Treaty of Versailles.

By virtue of these reservations, the United States claimed the right of delivery of a rigid airship by Germany to the United States.

On the sixteenth of December, 1921, at the 157th meeting of the Conference of Ambassadors, this right of the United States was acknowledged and it was further agreed that the United States should have constructed in Germany at Friedrichshafen on Lake Constance a dirigible of approximately the *L-70* type (about 2,400,000 cubic feet capacity).

The president of the Inter-Allied Aeronautical Commission of Control was accordingly instructed to take the necessary steps to see that the construction of this ship was started immediately.

It was also agreed by the United States that this ship would be devoted to purely civil purposes, and in view of this it is

contemplated that this ship will incorporate a passenger car in the design, somewhat similar to the passenger cars which have been included in former commercial rigid airships.

The Joint Army and Navy Board agreed that the acquisition of a German airship should be left to the navy and accordingly the navy was designated as the government department to handle all matters in connection with the acquisition of this ship.

Work in connection with the construction of this airship is progressing and naval officers have been detailed to the works of the Zeppelin Company as inspectors.

In view of the fact that the Germans were required to deliver all other airships to the Allied countries, the same requirement is to be exacted in this instance and this rigid dirigible delivered at the Naval Air Station, Lakehurst, N. J., where the navy has completed the construction of the world's largest airship hangar.

Some one has said that "The proof of the pudding is in the eating." In this case the proof of the ship is in the delivery.

Some may ask the question, "What does the navy want with a commercial type airship?" It is of course acknowledged that the Germans probably know more about the design, construction, and operation of rigid airships than any other people, and the experience to be gained by our design staff and operating personnel is invaluable, and this experience can be gained just as well with this type as with a purely military ship. Also, following the destruction of the *ZR-2*, the American public has to a great extent lost faith in the rigid airship, and they need to see such ships flying about carrying passengers in order to regain their lost faith, so that the navy may not be handicapped by lack of funds for their future development.

As previously stated, the total gas capacity is estimated at 2,400,000 cubic feet. In common parlance, the gas capacity of an airship is the total volume of gas contained in the gas bags when full, the ship being at sea level and with normal atmospheric conditions. The largest previous ships to be commissioned were the German *L-70* class, which had a gas capacity of about 2,400,000 cubic feet and were designed and constructed for the purpose of bombing New York. These ships were completed just prior to the armistice, and in accordance with the terms of

the peace treaty have since been surrendered to Great Britain and France.

The total lift of this latest airship is estimated at about seventy-two and eight-tenths tons. The "total lift" is the difference between the weight of air displaced and the weight of the gas used (hydrogen), the gas bags being full. Part of this lift or buoyancy is required to lift the ship or, as it is technically expressed, the "fixed weights." These include the hull, gas bags, car, and machinery weights, gasoline tanks, etc.; in other words, the fixed weights necessarily carried in flight, but which cannot be moved. In this case the fixed weights are estimated at thirty-five and four-tenths tons. The difference between the ship's total lift and the fixed weights gives the lift disposable for crew, passengers, fuel, water ballast, food, bombs, ammunition, etc., and is called the "disposable lift." This works out at approximately thirty-seven and four-tenths tons for a passenger-carrying ship of the above gas capacity.

Mere figures are of little value for purposes of illustration. However, to visualize the dimensions of this huge craft, compare its length overall of 743 feet with the overall length of our largest battleship afloat (a little over 600 feet); nor does the overall width of approximately ninety feet compare unfavorably with the *Maryland,* which has only a slightly greater beam. In this way, it is possible to picture these air monsters.

The hull of a modern Zeppelin consists of transverse frames or rings, made of duralumin, rigidly connected to longitudinal members of the same material, the rectangular panels formed between longitudinals being braced diagonally by what are known as diagonal wires, the whole forming a built-up tube, over which an outer cover of fabric (somewhat similar to airplane fabric) is secured. This structure is tapered at the ends to give a streamline form. An internal keel or corridor is fitted of triangular or trapezoidal shape in cross section, the base of which forms the bottom side of the ship, and runs practically the whole length. In this keel are fitted the gasoline and oil tanks, water ballast bags, crew's space, and other accessories. A walking way is fitted along the bottom of the keel on the middle line, to allow passage between different parts of the ship. This walking way is somewhat narrow (about eight inches wide) and if in flight a person should

accidentally step off, there is nothing between him and the great open spaces, except the outer cover of fabric. A line is strung along the top of the keel which is grasped when walking along the corridor, and until one becomes accustomed to it, this is grasped rather anxiously.

The transverse frames or rings are made rigid by fitting across them diaphragms of wire. These diaphragms also act as bulkheads separating the adjacent gas bags. These transverse frames are of polygonal shape, each side of the polygon forming a side of the ship. In the *L-70* class there are sixteen of these main transverse frames, which form with their wiring the longitudinal boundaries of the gas bag sections. There are therefore fifteen gas bags in this type ship.

The gas bags are made of cotton fabric, lined with goldbeater's skin to make them tight. Automatic gas valves are fitted to each gas bag to permit escape of gas when necessary. Cowls are fitted along the top of the ship to permit escape of this gas and also to assist ventilation of the keel and crew's quarters.

A control cabin of duralumin structure is built into the under side of the hull in the fore part. This cabin corresponds to the bridge of a ship, and contains the elevator and rudder controls, engine room telegraphs, telephone, navigating instruments, charts, tables, radio cabin, instruments, and signalling devices, besides various minor controls. Normally while in flight the following persons are on duty in the control cabin: captain, navigator, quartermaster at the wheel (rudder controls), height coxswain (elevator controls), radio operator (in radio cabin), and when coming in to the landing field, one man standing by engine room telegraphs, and a signalman standing by for visual signals.

This airship will have engine cars slung from the hull of the ship, by means of wires ropes and struts, each car containing one Zeppelin Maybach engine, with necessary instruments and controls. Each engine develops three hundred brake horsepower at 1,400 r. p. m. Access to these engine cars is obtained by gangways or ladders from the cross passages of the keel. One set of wing engines are fitted with reversing gear, so as to make maneuvering easier when coming in to the landing field.

PERFORMANCE

A military airship of the above gas capacity would have a maximum speed of sixty knots and carry sufficient fuel to give her a radius of action of about 4,500 nautical miles at this speed. Of course no ship can be expected to cruise at full speed continuously. However, at a cruising speed of forty-five knots, a radius of action well over 7,000 nautical miles can be expected. Hence, with favorable weather conditions, such a ship would be able to cruise from any port, on the Pacific Coast of the United States to Honolulu, and thence to Manila, without once being required to land and refuel. Truly a wonderful range, but it is even more wonderful when we consider that such a flight could be made in seven days.

Most of us are familar with the double crossing of the Atlantic by the British rigid airship *R-34* during the month of July, 1919. This ship had a gas capacity of approximately 2,000,000 cubic feet and her power plant consisted of five 270 horse-power Sunbeam "Maori" engines. She shoved off on her "great adventure," from the airship base at East Fortune, near Edinburgh, Scotland, at 1:48 A. M. G. M. T., July 2, and, after encountering adverse winds and weather, finally landed at Mineola, Long Island, at 2 P. M. G. M. T., July 6, with only two hours' fuel supply remaining on board. The time taken to cover the 3,100 nautical miles was 108 hours. The return trip was started at 3:54 A. M. G. M. T., on July 10, and ended three days, three hours, and three minutes later at Pulham, Norfolk, England.

Probably the most remarkable flight ever accomplished by an airship was made during the war by a German Zeppelin. This flight was made from Jamboli in Bulgaria to German East Africa and return. The Zeppelin was of the naval *L-59* class, and had the same gas capacity and many characteristics in common with the later *L-70* class. The ship left Jamboli at 8:35 A. M. on November 21, 1917, with a crew of twenty-two men, and carried medical supplies, munitions, and special instructions for General Von Lettow, commander of the German forces in East Africa. She crossed over the Mediterranean, flew over Cairo and Khartoum, being seen at both of these places, and followed the Nile River to Lake Victoria Nyanza, where she received radio mes-

sages from the high-powered station at Nauen, Germany, to return to Bulgaria, since the German forces in East Africa had been captured. She accordingly turned back and arrived safely at Jamboli at 7:35 A. M., November 25, having completed a round trip non-stop flight of about 4,300 miles in the remarkable time of ninety-five hours. This represents an average speed of forty-five miles an hour.

NAVAL USES

Officers of experience in the navy often ask the questions: "What use are rigid airships?" "What do we want with them?" These questions have been answered by no less an authority than Admiral Lord Jellicoe, commander-in-chief of the British grand fleet at the battle of Jutland. In his book, *The Naval Crisis*, he makes the assertion that one rigid airship, for purposes of naval scouting, is worth two scout cruisers. If anything, this is an understatement of their value, since in this capacity they are undoubtedly without a serious rival. One need only consider their range, speed and endurance to realize this. Think of the advantage of having a scout capable of ranging about over the sea with the fleet and ready when needed to proceed in search of information at a speed of sixty knots. Suppose adverse weather conditions are encountered and the airship has to buck a thirty-knot wind. It is still capable of making a speed of thirty knots over the sea. Even under these adverse conditions, the airship still maintains her superiority over the sea scout, for what surface craft can run at full speed into a thirty-knot wind?

A stiff wind has very little effect on an airship, except in so far as it affects its progress. The steadiness of an airship in a squall has been remarked upon by the late Air Commodore Maitland, C. M. G., D. S. O., A. F. C., R. A. F., in his book, *The Log of H. M. A. R-34*, an excerpt from which reads as follows:

> 7:10 P. M. Struck by a fierce squall. Heavy rain. Ship remarkably steady considering intensity of the squall.
>
> The rain is driving through the roof of the fore car in many places, and there is a thin film of water over the chart table. The wind is roaring to such an extent that we have to shout to make ourselves heard.
>
> Am struck by the steadiness of the ship in this squall, which is a very severe one. Beyond a gradual and very slow pitching, causing us to hold

on and making everything slip about very considerably, we feel no inconvienience and not the slightest symptoms of seasickness. The sea, on the other hand, when we last saw it, was very rough and I, for one, being the worst possible sailor, would certainly be feeling horribly ill.

In addition to the speed superiority, the visibility from an airship is much greater than from a surface craft.

As a scout, the airship also has the advantage of being able to obtain information with respect to an enemy's main body without the necessity of fighting an engagement with the enemy's advance force. It is also possible, by hovering about in the clouds, to obtain such information without being seen. Even if discovered and enemy fighting craft are sent out to drive the ship away, the information will already be obtained and it is a simple matter to climb and escape into the clouds. It is not possible for heavier-than-air craft to climb as rapidly as a rigid airship. In addition, fighting aircraft may be carried by sacrificing the number of bombs carried by the airship.

While it is admitted that the Germans employed their Zeppelins in raiding expeditions for some time after an efficient defence had been developed against them, it is known that even with the small bombs in use and with the poorly constructed and inaccurate bomb sight employed in the first part of the war, from 1914 to 1916, a great deal of damage was done by them, far more than was admitted at the time, which is proved by statistics published since the war. Consider then the effectiveness of a fleet of rigid airships, similar to the *ZR-2,* each capable of carrying a number of high explosive bombs weighing a ton each, when directed against the navy yards, arsenals, and advance bases, particularly at the outbreak of, and following closely on the heels of a declaration of war. Unless these places were adequately defended (and few of them are) the effect would be paralyzing.

For convoy they are particularly useful due to their superior vision, speed, and range of action, and for the same reason they are very effective for anti-submarine patrol. During the late war the British used these ships effectively for convoy and anti-submarine patrol duties.

In time of peace these ships will have a multiplicity of uses for the fleet. For example, during target or torpedo practice, the airship could hover directly over the target so that photographs

could be taken which would form a permanent and accurate record of the practice.

Also the control car of a rigid airship would be an excellent position from which to view the fleet at maneuvers, or during the latter stages of a war game. Any one who has ever flown appreciates the detail with which everything below is shown, and the different moves of the opposing forces could be observed much the same as the chess player observes the moves of his antagonist on the chess board.

On account of their speed and endurance, these ships will undoubtedly be most useful for rapid communication with our outlying possessions of Hawaii, Guam, and the Philippines, and tend to knit them more closely into the defence of the Pacific.

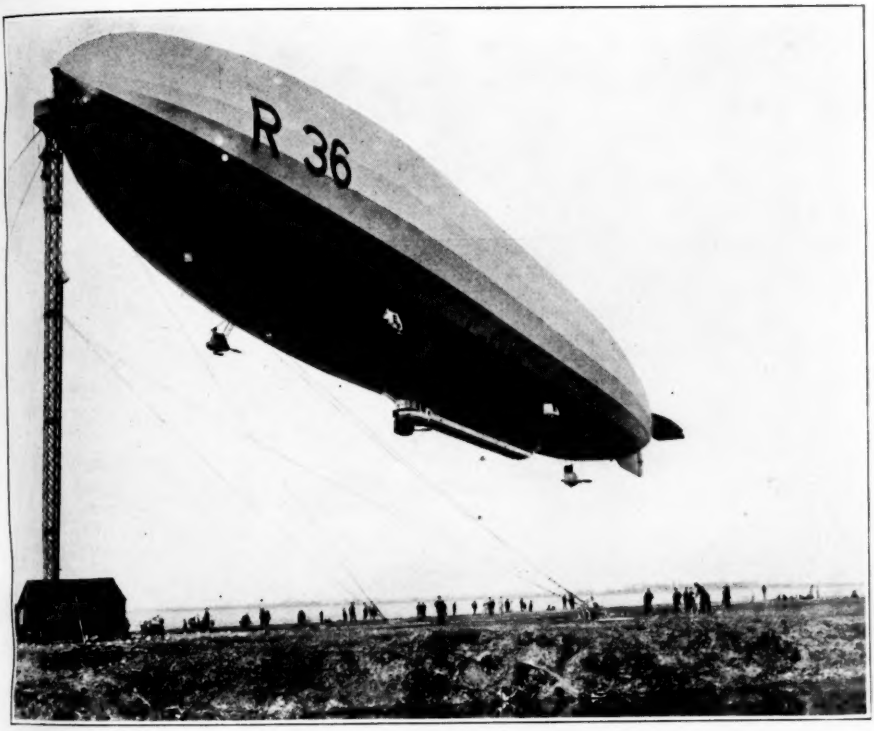
HANDLING

Although an airship has little to fear from any except the strongest winds when she is in the air, great difficulty has been experienced in handling her on the ground and even under normal conditions a handling party of from two to four hundred men is necessary. That is the reason there were no Zeppelins present with the German high sea fleet until the second day of the battle of Jutland. Although the wind was not particularly high, it was sufficient to prevent the ships being taken from their hangars. However, the second day of the battle a few Zeppelins were taken out of their sheds, and these assisted the scattered units of the German fleet to regain their base successfully.

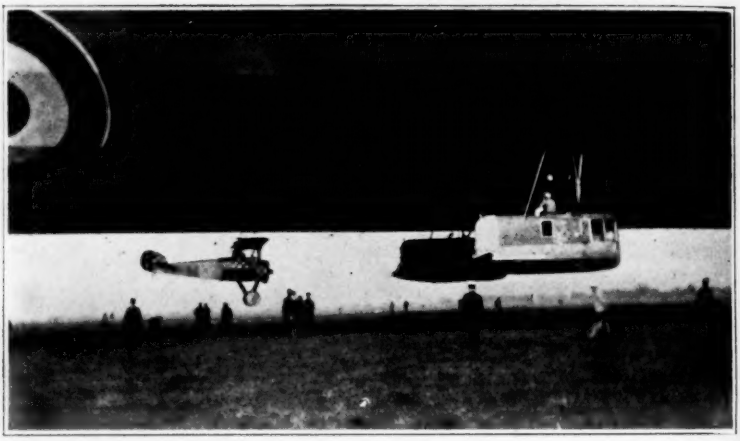
It was therefore very essential for the future of airships that some method be evolved whereby they would be as independent of their sheds as a transatlantic liner is of a dry dock. This has been successfully accomplished by the mooring mast.

The mooring mast consists of a steel structure about 150 feet in height, and the airship is secured, by a bow mooring gear, to a special attachment at the top of this mast.

To moor, the airship approaches the landing field as for a normal landing. Previous to this a special wire cable, wound on a drum and operated from a winch at the foot of the mast, is carried up the mast through the mooring attachment and veered out to the ground in a direction opposite to that from which the wind is blowing, a distance of about 600 feet from



Commercial Airship R 36 Riding to a Mooring Mast



RIGID AIRSHIPS LEAVING GROUND WITH SOPWITH CAMEL FIGHTING AIRPLANE SECURED BENEATH

the foot of the mast, the end of the cable being marked by a red flag. The ship is headed into the wind and brought directly over this flag, the ship having an altitude of about 500 feet, and at this instant the airship's mooring cable is released, the end being weighted, and when it strikes the ground, a man stationed there for this purpose, quickly connects the ends of the two cables together, by means of a special coupling. The ship's engines are then stopped and she is permitted to rise slowly until she rides from the cable at an altitude of about 1,200 feet, the weight of the cable tending to gradually stop the ascent of the ship. The winch is now started and the cable reeled in until the nose of the ship is hauled to the top of the mast and properly secured. The mooring attachment at the top of the mast is mounted on a ball bearing so that it may revolve freely and thus permit the airship to swing head to the wind, at the same time holding the ship rigidly.

Fuel, gas, and water lines are carried up the mast to the upper platform, where they may be connected to the ship's systems, and the ship refueled or gassed without the slightest difficulty.

Airships have been moored out to a mast for months on end without the slightest trouble, and have been released from the mast in winds of about fifty miles per hour, and moored to the mast in winds of slightly less force. The most remarkable part of the whole operation is the fact that only one man is needed to unmoor and only six men needed to moor the largest ship. When ready to unmoor, the ship is held to the mast by means of a stopper, and it is only necessary to knock off the link with a hammer to release the ship entirely from the mast.

With equipment of this sort at all fleet bases, rigid airships will be able to operate directly with the fleet at all times.

[COPYRIGHTED]
U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE NAVAL WAR

SOME LIGHT ABOUT THE "GOËBEN'S" ESCAPE

BY CAPTAIN GABRIEL VOITOUX, FRENCH NAVY

At the very end of July, 1914, Europe was on the brink of war. Every effort, at least on the French and British sides, to prevent the clash, had failed. The navies were prepared for action.

On the first of August the main French fleet was at Toulon, ready to put to sea within six hours' delay. It was there, a force, alas, *not well balanced,* but having had a good training in the hands of an admiral who had proved himself one of the best French sailors, most energetic, especially while still a young man in some Indo-China war affair.

Germany kept her main fleet in the North; this fleet was ten-fold as strong as was necessary to do away with the old cruisers that France had, then, appointed to the British Channel. Besides, Germany had placed in the Mediterranean two ships of high value, the battle cruiser *Goëben* and the scout *Breslau* both of twenty-seven—twenty-eight knots; faster, by six knots, than any of the French ships.

In fact, this must be noticed once for all, France *had no battle cruiser type;* as for scouts, she possessed nothing that could be compared to the *Breslau,* or to any of the four similar ships belonging to the Austrian navy.

The Germans had placed the now famous division—*Goëben* and *Breslau*—in the Mediterranean with the exclusive purpose of interfering with the transportation of the French 19th Corps from North Africa to France.

Strange to say, the *Goëben* could outrange the French ships by some 4,000 meters, and outspeed the fastest of them by six knots. So, unless caught in the meshes of a net of French ships and, trying to escape, being forced to approach within the range of some of them, the Germans ran no risk of being fought by French men-of-war; even coming in their range, the *Goëben's* artillery was heavier than the guns mounted on every French ship, with the exception of dreadnoughts; these were armed with 305 and 340; but, as said above, they had a lesser range than the *Goëben's* 280. Must I add that the French *armoured cruisers* were a great deal inferior to the *battle cruiser "Goëben"* in *protection* and *artillery* as well as in *speed?*

The Austrian navy, of a strength about three-fifths that of the French, included four scout cruisers averaging twenty-five—twenty-six knots, of a class, as said before, that France was entirely deprived. Those scouts, together with the German *Goëben* and *Breslau*, might have made a great havoc among the French troopships had they not been hampered, as will be seen further on.

Italy was an ally to Germany. But she had refused to back Austria, some twelve months previously, against Serbia. It was not likely that she would take arms against the Entente. But nobody, previous to the fourth of August, could tell what step she would choose. Her navy was stronger than the Austrians; still it came after the French.

Great Britain, of course, was not likely to become an enemy of France with which she entertained an *entente cordiale*. But no one could, then, be assured whether she would enter the conflict or not. This assurance came on the fifth, when she deliberately decided to take part in the hostilities. Had it been some twelve hours sooner the war would have probably ended a short time after the event. In fact, on the fourth the British forces had met and vainly followed the Germans, but, as was written before, "Time of saluting was past, but time of war had not yet come." And, thus, the opportunity of finishing the two Germans was missed. Nobody could, then, guess, how profitable this miss would be to the Germans.

The British forces in Mediterranean were carefully selected: three battle cruisers, like the *Goëben;* three scouts, like the *Breslau.*

These six ships were undoubtedly appointed to the Mediterranean to, eventually, overcome by three to one the German division. Besides, Great Britain entertained on this station four armoured cruisers, some fifteen destroyers and twelve submarines.

As can be already seen, the mission of the *Goëben, Breslau* would be barred if the British took part in the war. But the Germans hoped to the last that they could prevent such eventuality and keep Great Britain neutral.

According to the Franco-British agreement, following, I suppose, the *entente cordiale* established, the French navy was to control the *Western* Mediterranean, while the British would perform the same duty over the *Eastern* part. Neither of the two commanders was to control the other; it was plainly prescribed that each one of them, according to the circumstances, could enter the other's waters to give him assistance without, in any way, placing himself under his command. This part of the agreement was modified in London on the sixth of August. It was, there and then, decided that the whole Mediterranean forces would, henceforth, be placed under a French admiral's command. This change was notified to the French commander on the eighth. But, in fact, by an express order from the French Ministry of Marine, the command was only transmitted on the thirteenth, when Admiral Milne was called back to England. The apparent cause of this delay was that the French Commander was a vice-admiral while the British was an admiral.

A NAVAL POLICY HANDICAP

Before going through describing the operations, from the start to the *Goëben's* rush through the Dardanelles, I must indicate how, according to my opinion, the British naval operations were handicapped.

Before 1914 nobody knew what a naval war would be like with the new weapon introduced: *the submarine*. Of course, through numerous exercises, its offensive power had been revealed, but as to the means of meeting the danger, the Admiralties were out of wits, for there had been no war experience to throw any light on the subject. When some young officer happened to succeed in attacking, his admiral barely acknowledged the fact—when he did not receive the report with a rebuke.

Still the submarine warfare (U-boat torpedoes and mines) was so impressive on the Admiralty that, for its natural spirit of *offensive* was substituted that of *defensive,* which had never before been the British policy.

This defensive policy can be read in Admiral Jellicoe's memorandum written on the eve of the war. There he clearly describes his purpose to meet destroyers' and submarines' attacks by a *turn away.* He declares as well that, were the circumstances such that he should be brought to believe that the German battle fleet tried to draw the British over a mine field, or in the vicinity of submarines, he would cease the pursuit. The maintenance, at all cost, of the British naval superiority haunts his mind and fortifies this defensive policy, which was not Admiral Jellicoe's monopoly, whose views were backed by the Admiralty itself who originated it. This is well brought to light by the Admiralty's orders given at the very beginning of the war to Admiral Milne and, consequently, to Admiral Troubridge, his second in the Mediterranean; orders which can be summed up in these words: *"Avoid premature action with a stronger force than yours."*

Through the course of pre-war maneuvers, with Admiral Beatty as antagonist, the same defensive policy led Admiral Jellicoe's actions, according to Mr. Filson Young's recent book: *"To avoid Beatty's destroyers' attacks, Admiral Jellicoe regularly employed the method of turning his ships away."* Mr. Young says that, while being on board Admiral Beatty's flagship *Lion,* and noticing this very *turn away* maneuver, he was told by an officer of the staff, *"If he does that when the enemy attacks, he can't be defeated, but he can't win."* The experience at Jutland, even at Dogger Bank, proved this prophecy.

By this digression, I only want to inform the reader that a defensive policy, due to torpedoes, submarines and mines, prevailed in most naval circles, though not in the minds of all the naval chiefs. Beatty had a real offensive spirit, and I must say, that such offensive spirit reigned in all naval French circles, without a single exception.

PRELIMINARY REMARK

The French commander was ordered by the French Government not to convoy the troopships as had been previously intended,

the war minister accepting the responsibility of their sailing without an escort. It must be, here, noticed that these troopships were to sail from all the ports of North Africa, including, of course, Bizerte, Bône, Philippeville, and so on, up to the ports of Morocco.

POSITION OF THE BELLIGERENT FORCES ON THE FIRST OF AUGUST

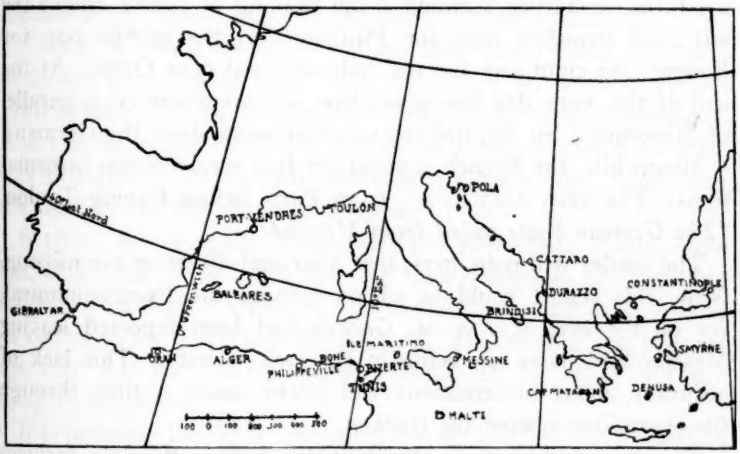
French Fleet—Toulon, ready on six hours' notice to sail. Waiting for an order.

British Forces—Undoubtedly Malta.

German Division—Messine, together with the German liner *General.*

Austrian Fleet—In the Adriatic, Pola, Cattaro.

Italian Fleet—In the Italian harbours.



EVENTS OF THE SECOND OF AUGUST

1:00 A. M.—*Goëben* and *Breslau,* under Admiral Souchon, sail from Messine bound to an unknown destination.

4:53 P. M.—The French admiral, still at Toulon, learns that the German ships are said to be in the vicinity of Bizerte, no doubt ready to interfere with the French troops' transportation when the war shall be declared. The French admiral is still at Toulon awaiting for orders. So far, there is no clue about the British, the Austrian, and the Italian forces.

7:00 P. M.—The Germans having been reported in the vicinity of Bizerte, the French admiral judges that the troopships should be in danger of encountering them, so he sends orders forbidding any sailing without an escort, *thus infringing willingly the orders he had received not to convoy.* At the time being, the French admiral is still awaiting the order to put to sea.

10:50 P. M.—At last, the French commander receives the following order: *"Put to sea and stop the 'Goëben'* and *'Breslau' if war is declared."*

"Stop the *Goëben*" was as easy a task as to put a bit of salt on a bird's tail to catch it.

EVENTS OF THE THIRD OF AUGUST

7:00 A. M.—The whole Mediterranean French fleet is at sea, the three squadrons forming a fan heading at twelve knots: the left, and strongest one, for Philippeville; the middle one for Bougie; the right one for the Baleares, and next Oran. At the end of this very day the whole fleet is somewhere on a parallel of Minorque. So far, there is no other news about the Germans.

Meanwhile, the French commander had received two informations: The first, 1:13 A. M., from Paris before leaving Toulon, *"The German boats sailed from Messine."*

The reader will note, here, that *hour* and *direction* are missing. Now, this report could be of no help to the French admiral, for on the eve, at 1 A. M. *Goëben* had been reported leaving Messine and, later on, being in Bizerte's vicinity. This lack of accuracy about informations will occur many a time through the operations against the *Goëben.*

The second, 1:30 P. M., the British admiral offers his services to the French commander: *"In what way shall I help you the best?"* and was answered: *"In dealing with the German cruisers."* Remark here that England and Germany were not yet at war.

6:00 P. M.—Admiral Souchon, who was really close to Bizerte, learns the breaking out of war with France and is said to have received, then, the order to make way for Constantinople. But he was too close to some French ports, where he might surprise the troopships, not to attempt the chance to do some mischief before turning back to the East; besides, as Souchon declared it subsequently, he wanted to fool the French commander.

11:00 P. M.—Paris informs the French commander that a cargo, supposed to be a collier, is anchored at the Baleares, probably for the *Goëben.*

EVENTS OF THE FOURTH OF AUGUST

1:15 A. M.—The French admiral learns the state of war, *this about six hours after the news had reached Admiral Souchon.* As said before, the French fleet is, then, forming a fan heading southerly, the three squadrons being in the latitude of the Baleares. From the information in his possession the French admiral had no reason of changing his direction nor his speed. So far, he knows nothing of Italy's attitude and is a bit anxious because he is leaving, far behind, the coast of France unprotected.

4:50 A. M.—He learns the shelling of Bône and orders immediately full speed, same course for the three squadrons.

6:00 P. M.—A Paris radio enjoins him—*Italy being neutral*—to detach immediately some ships to convoy the *Jean Bart* and *France,* both rallying Toulon, the latter being slightly damaged. And this is, by the way, how, *incidentally,* the neutrality of Italy was brought to the French commander's knowledge, long after the notification was made to France.

6:15 A. M.—A radio brings him the news that Philippeville has, also, been shelled and that the enemy cruisers are steaming full speed westerly. Order is sent to the left squadron to incline its course to the right, towards Algiers. This motion was ordered for fear that the *Goëben* might glide along the coast and slip away to the West.

It is precisely here that intervenes the trick of Admiral Souchon who deliberately wanted to fool the French: as soon as he estimated that he could change his course without being noticed he rounded to the East and went speedily towards Messine.

Fact that the French commander could not guess, for he thought that, having left Messine, shelled Bône and Philippeville, then taken a course westerly at full speed, Admiral Souchon would never go back to the East, where it was more probable he should meet the British forces threefold stronger than his.

The French admiral had hoped for the opportunity of seizing the German cruisers into the meshes of his net. He thought that, once caught, the *Goëben,* trying to escape, would be com-

pelled to come in close range of the guns of some of his ships. But he was deprived of such an opportunity while he reached the African coast, without having seen or heard of the enemy.

11:00 A. M.—While they ran to the East, the German boats made contact with the three British battle cruisers; these followed the Germans the whole day, ready for action, if war was declared. They both made a tremendous race, one pursuing the other, with no other result than a great consumption of fuel, on both sides.

At the time, it is said, Admiral Milne tried to inform the French commander, but, if so, the radio never reached the French flagship.

4:30 P. M.—An Oran wireless informs that a battle is engaged between coast artillery and ships, *but gives no particulars about the place, nor the hour. Is it the "Goëben"?*

8:00 P. M.—The above wireless is nullified.

11 P. M.—Paris prescribes *"Place the submarine flotilla along the south coast of France, between Villefranche and Port-Vendres, as a protection against the 'Goëben.'"*

This radio was not to make the French commander guess that the *Goëben* had already left the western Mediterranean.

EVENTS OF THE FIFTH OF AUGUST

7:00 A. M.—Paris authorizes adequate measures to realize the security of the troopships between Casablanca and Bordeaux.

0:44 P. M.—Paris informs that the presence of auxiliary cruisers is to be feared on the south coast of France.

7:55 P. M.—Paris suspends the sailing of troopships from Morocco until the awaited concentration of the British cruisers. Meanwhile Paris lets the French admiral at liberty to assure, for the best, the security of the troops' transportation between Casablanca and Oran.

II. B.—Up to this very moment, and further, the French commander was bound to believe that the *Goëben* and *Breslau* were really in the Western Mediterranean and that, besides, auxiliary cruisers might attempt to sink the troopships. So, *instead of following the Government's previous order forbidding the convoying, he decided to escort all the troopships. He did so, of course, to protect these ships, but mainly to create the*

opportunity of approaching the "Goëben" and "Breslau," cruisers which outsped and outranged all his ships; and, besides, of which he could not make out the real position except that, as far as the present time, they were some place or other in the Western Mediterranean, part assigned to the French.

0:30 P. M.—Bizerte sends to the flagship *Courbet* a wireless stating "Admiral Milne with his battle cruisers, armoured[1] cruisers, and destroyers, *is researching south of Sardaigne* the German cruisers which, on the fourth, 5:00 P. M., were forty miles from Marittimo heading to the East."

There is a flagrant contradiction: The Germans seen forty miles from Marittimo must have returned from their way, said to be East, by taking a new course to West. Because there was, in appearance at least, an unmistakable fact; *Admiral Milne was researching them at the south of Sardaigne, some 150 miles west of Marittimo.* Admiral Milne would not have been researching the *Goëben* there if this cruiser had been elsewhere, a long way to the East. The real fact must be that the information was wrongly worded, for the British could not have been researching an enemy, some 150 or 200 miles from the place he was supposed to be, according to the report. Besides, if in the mind of the French commander, Admiral Milne was really researching the German south of Sardaigne, he was bound to believe that the Goëben was anew trying to escape by the West. Inaccuracy of information, low speed of his ships, the need of protecting the troopships and, in doing so, get the only chance he had to approach the enemy whose real position was impossible to make out, induced and entitled the French commander to make no move to the East where, besides, adequate and very strong British forces were close to the Germans. Auxiliary cruisers had been reported in the Western Mediterranean, there was also the dreadnought *France* partly disabled. On the other part, the Algerian troopships were to sail the next day; it was better keeping the previous dispositions: If *Goëben,* or any other ship were preparing to attack them, there would be necessary forces to beat, or, at least, repulse them.

[1] It must be scout cruisers, but not armoured cruisers.

EVENTS OF THE SIXTH OF AUGUST

1:45 and 4:25 P. M.—Two successive wireless messages bring to the French Admiral the certainty that *Goëben* and *Breslau* are back to Messine coaling since the morning. Then the French left squadron was some four hundred miles from Messine, much too far to make any useful move.

On account of Italy's neutrality the Germans, who were anchored since the eve, were bound to sail before night. So a rush to the East would be quite vain. Besides, what would be Admiral Souchon's next move? Was not there, close by, the fleet of Admiral Milne ready to prevent any escape?

To this end the British armoured cruisers were placed across the Otrante Canal, shutting the way, in and out, the Adriatic. The Messine north and south issues were guarded by British Scouts. Admiral Milne, handicapped by the persistent belief that Admiral Souchon would either try to go back to Pola, or leave the Mediterranean, advised the French commander that he might be later induced to take base at Bizerte, fairly west of Malta. The French admiral, himself, believed that the Germans might possibly endeavour to escape through Gibraltar. According to this belief he did not judge necessary to bring any change to the previous dispositions of his ships: They were spread at all the points from which the troopships were sailing and where, as well as an aggressor, or as a retreating ship, the *Goëben* might pass; that is to say in the very best position, with his low speed ships, to have a chance of meeting the two fast Germans. These were to leave Messine instantly, but bound to where? Admiral Souchon alone knew.

Even had the French commander known Souchon's intentions, he could not have thought an instant of pursuing the *Goëben*, which had some five hundred miles advance and was eight knots faster than the French ships, those who were strong enough to beat him: dreadnoughts only. Besides, may I repeat it, he knew perfectly well that the British were in touch with the *Goëben* and possessed, solely in battle cruisers and scout cruisers, threefold the strength of the two, *Goëben* and *Breslau*.

We must recollect that other German ships, for instance auxiliary cruisers, had been reported by Paris, as being in the western

Mediterranean; also that the battleship *France* rallying Toulon, was partly disabled (the fact was that the dreadnought *France* was not completed and, so, very exposed on her way to Toulon). Finally that Paris had ordered some measures of security concerning the motion of troops off the Morocco and Algerian coasts.

We must anew notice that Admiral Milne, himself, thought that Admiral Souchon was either bound to Pola or the Western Mediterranean. Of course, it did not come to his mind that Souchon should take his course for Constantinople, because Bône and Philippeville are really not quite on the way from Pola to Constantinople and that lingering near and turning around a force threefold his, as he had already done, was rather hazardous and like playing with fire.

Admiral Troubridge in the meantime had barred the Otrante Canal with his four armoured cruisers and some destroyers. Scout cruisers were guarding the north and south exits of Messine. *Gloucester* was watching the south one. The battle cruisers were intended to be, according to previous orders, west of Sicilia ready to meet the enemy whether he tried to escape by the north or the south of Messine.

In fact, the run of the previous two days had made a big hole in the bunkers, and the three battle cruisers were undoubtedly coaling at Malta while the Germans had twenty-four hours coaling at Messine. Besides, we must remember that Admiral Milne, eventually, intended to take base at Bizerte, west of Malta, so strong appeared his belief that his antagonist had only two chances of escaping: Pola or Gibraltar.

On the French side, as Djemal Pacha had spent aboard the French flagship *Courbet* the last fortnight of peace time (July, 1914), the French commander was not prepared to guess that Djemal Pacha himself, and his kin, would so suddenly be so hospitable to our enemy, responsible for the war.

6:00 P. M.—The British armoured cruiser, watches at Otrante the Austrian scouts, who might try to get at the French troopships. They, as well, guard the passage by which *Goëben* might try to escape on its way towards Cattaro or Pola.

Gloucester, the gallant scout, watches the south exit of Messine, ready to shadow the Germans.

The Kaiser has just forwarded his send-off (5:00 P. M.) expecting that the ships would safely get through.

Goeben and *Breslau* sail southerly at the sounds of *"L'Allemagne au-dessous de tout!"* Just out they fall on the *Gloucester!* Are the British forces close behind this scout, or are they miles away? In fact, *Gloucester* screens nothing. I cannot tell, with certainty, where the three battle cruisers were lying or cruising.

Goeben takes its course South, then East, afterwards northeast. And the while *Gloucester* is left able to report what he likes to the British admirals (Milne and Troubridge) about the Germans' motions.

Admiral Troubridge sticks to his watch. As he was ordered, *he will not prematurely engage any action with the "Goeben," which he considers a stronger force than that of his armoured cruisers,* stronger in *speed, armament* and *protection.* So, whatever *Gloucester* may report he will not move, but maintains his watch against eventual Austrian raiders, and faces the *Goeben, only* if he is compelled to.

10:00 P. M.—the Germans were closing the Canal of Otrante when Admiral Souchon played his second trick in turning from northeast to southeast thus heading for Cape Matapan instead of the Adriatic.

This move does not pass unnoticed by *Gloucester,* who follows endeavouring to send reports to the British admirals and succeeding the task, although the efforts are made by the Germans to meddle his radios.

Admiral Milne does not appear, his battleships being apparently still coaling. Admiral Troubridge, sticking strictly to his orders, takes no step to follow the Germans. (Later he was tried by a martial court and was *"fully and honourably acquitted,"* his conduct being blameless).

So, the Germans are at large, only shadowed by a tiny brave scout.

EVENTS OF THE SEVENTH OF AUGUST

Early in the morning the little British David launches a torpedo at the *Breslau* and misses the hit but by a few yards. Then this David tries shelling the same. But the German Goliath (the *Goëben*) turns towards the British David, which has nothing left but to make its retreat.

Reaching the Cape Matapan the Germans meet a collier and order its captain to go to, and take the anchorage near a small island called Denusa.

The German liner *General,* who has followed, is sent to Smyrne where its radio apparatus will constitute a "relay" to reach Constantinople by German means.

EVENTS OF THE EIGHTH OF AUGUST

The *Goëben* and *Breslau* are coaling at Denusa. The *General* has reached Smyrne. Admiral Souchon is, now, in direct communication with Constantinople. A secret treaty, it is said, had since the fourth, been agreed upon between Germans and Turks. But, as in a comedy, the passage through the Dardanelles is still refused to the Germans.

The French ships, some thousand miles away, are out of question. As for the British, who might have been close by, they are seen or heard nowhere. But the hope is that they will rally without notice.

EVENTS OF THE NINTH OF AUGUST

The coaling is finished. To prolong stay at Denusa would be dangerous. Admiral Souchon having, himself, a good knowledge of the Straits, and of the position of the mines previously laid by the Turks, while they are at war with Italy, decides to sail for Constantinople.

EVENTS OF THE TENTH OF AUGUST

5:00 P. M.—*Goëben* and *Breslau,* reaching the Dardanelles, ask for a pilot. A small steamer comes ahead of them and, taking the lead, signals: "*Follow Me!*"

9:00 P. M.—The British forces arrive at last. But the night has then fallen. The entrance is refused, once and for all!

Somebody has written that *Nelson, Farragut,* or *Suffren,* would have forced through the passage. But, at their time, they were left entirely to themselves. There was no radio apparatus, and no Government behind, instantly able to mark its will. (*I think Admiral Sims would have forced through.*)

The defensive spirit born out of the submarine warfare mystery, and which spread, so unhappily, from the admiralties to some naval chiefs, was unknown at the time of these great men.

The fact is that the success of the German admiral was complete. He had fully realized the Kaiser's wish to place a German at the head of the Turkish navy.

The refusal openly made to the numerous calls of Souchon to be admitted at Constantinople, was a third trick of this admiral, to make the Allies believe that the German cruisers would be compelled to return back to the West and make their ships slack their speed during their easterly course.

The God of War was not, then, with the Entente.

It is a great pity that the *Goëben* should have been allowed to escape, for the war would probably have lasted but a few months, had it been captured. The end would have come without the whole of Europe's being set afire, and some greedy land hungers would not have appeared on the stage. People who are now enemies would still live in peace, and millions of lives should have been preserved. Misery and failure of nations would have been unknown.

But if really the length of the war should have been lessened, had the Mediterranean fleet succeeded in arresting the *Goëben* and *Breslau,* and if this unhappy fact is imputable to some one, who is to blame?

Some people may say: *FATALITY!* But no sailor will admit such a reason.

Some French accused the French commander.

Numerous British believed in Admiral Troubridge's neglect. Among people of both nations, many wondered why no information appeared, nowhere, about the whereabouts of Admiral Milne's battle cruisers, from the sixth to the tenth of August 1914.

On his side, the man in the street wondered how some fifty ships could, thus, have missed two. For Admiral Troubridge, who deliberately decided not to follow the Germans while they were very close to his armoured cruisers, and while he knew perfectly well where they were and what course they followed, a Martial court has decided *"not guilty"* in acquitting him *"fully and honourably."*

For the French commander, who, between the early fourth and the sixth in the afternoon by every information was made to believe that the enemy was in the Western Mediterranean, who

was responsible for the French shores, ships, men of war and troops, is there any blame whatever?

For the British commander I possess no accurate information as to his whereabouts. A few months ago the *Daily Mail* and the *Times*, if I am not mistaken, announced the imminent issue of a full account of the operations that had taken place on Admiral Milne's side.

But in reality the blame does not rest only on the sea actors' shoulders. The *spirit of defensive* which prevailed previous to the war, and at its breaking, had taken its origin in the midst of the Admiralty.

The memorandum of Admiral Jellicoe, about his intended policy against an enemy, the Admiralty's approval of this document, the order of the Admiralty to Admiral Milne not to face prematurely a stronger force, prove abundantly the defensive spirit which handicapped any naval success.

As for the French they entertained no defensive spirit. But there was a lack of preparedness unbelievable: France possessed no battle cruisers nor any scout. The range of the artillery was quite insufficient. No ship was equipped with the fire control director. As for the air forces they were next to *nil* in August, 1914.

Unpreparedness had deprived the French chiefs of the very means indispensable to back a fighting spirit. *Hares cannot be hunted with turtles.* France Admiralty had forgotten what *armament, speed* and *protection* were.

The informations given to the French commander were often worded without the necessary care: *hours, situations* were, sometimes, omitted, as the reader has certainly noticed in perusing my modest contribution to put some light on the case of the *Goëben's* escape.

[COPYRIGHTED]

U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE STRATEGY DEPARTMENT OF THE WAR COLLEGE

A LECTURE FOR THE OFFICERS OF THE UNITED STATES ATLANTIC FLEET*

BY CAPTAIN REGINALD R. BELKNAP, U. S. N.

The Department of Strategy of the War College includes the subjects of international law,‡ policy, strategy, and logistics, together with the concrete application of strategy in chart maneuvers.

INTERNATIONAL LAW

With international law in its fundamentals all naval officers are familiar, through study at the Naval Academy and preparation for examination. The subject is one in which all officers should be well grounded, particularly those who may come to command. Others, too, should be well informed and all may be assured of finding their interest increase the more they become versed in it.

The navy's principal and normal field is international, the navy being a powerful agency in the diplomacy of peace as well as of war. The ordinary course of cruising brings officers into situations where they must decide whether to act or to refrain, and if to act, what to do, how far to go. The decision, to be correct and suitable, must be founded upon a good grasp of law and precedent as they apply to the immediate circumstances. With the knowledge and cultivated judgment derived from consistent preparation, an officer may meet such situations with confidence. One hears much and often how the cable and radio have lessened the responsibility and discretion of ministers and naval commanders abroad, but let us not be deceived by any such misleading idea. In the first place, international relations have become much more

* Delivered September 8, 1921.

‡ Since this was written, International Law has become a separate department, as formerly.

complex partly through these very means of rapid communication. But besides that, cable and radio messages do not always pass quickly. At headquarters at home they may cut only a small figure in the day's business there, and the instructions sent to you may be so general or so apparently in conflict with needs or facts as you see them as to tax all your powers to conform.

Four times in the Boxer troubles the American admiral had to act without guidance from the Government. Not long ago in the Caribbean, a gunboat commander had to take a decisive stand on a doubtful question on the spur of the moment. On the retirement of an American admiral some ten years ago, he was at the instance of the State Department especially commended for the sagacity and insight of his reports during a trying period in China. Instances could be multiplied, and no matter what may be the future development of quick communication, the man on the spot must always be a great factor. Merely to report a situation intelligently, he must be able to comprehend it himself; how much more is required when he is called upon to act. And when he goes into a conference, if he is to play a worthy part there, he must be well grounded, well prepared.

It is inspiring to know our traditions and a word as to the achievements of our forbears may not be out of place. The War College walls bear a placard containing the tribute of two eminent statesmen to the naval officer as a diplomatist. In 1898, in London, Lord Salisbury, the British prime minister and secretary for foreign affairs, said that the promise of Europe to the Cretan people that they should have autonomy under the suzerainty of the Sultan, a problem of great difficulty, owed its fulfillment to the admirals of the international fleet, by their development in a very remarkable degree of the powers of diplomacy and government. And during the winter of 1902-3, apropos of a revolutionary situation existing in the Caribbean, Mr. John Hay, secretary of state, remarked to President Roosevelt: "I always feel relieved when the naval officer arrives on the scene because he always keeps within the situation." Two years later, Mr. Hay said to Rear Admiral Chadwick, then president of the War College: "We have had a number of difficult international situations in the West Indies and Venezuela in the past two years and

they have all been handled by naval officers very well. They have not made a single mistake."

There you have extreme instances of the various situations where a naval officer may have to act—from guarding a consulate during local disorder to joint operations in a complicated matter of far-reaching effect. And there is another high plane where likewise our officers have borne great responsibility with credit—in advising the State Department on neutrality matters during the late war, and in being delegates to the great international conferences in recent years at The Hague and in London. Such is our background, such is the record of accomplishment and trustworthiness which officers of the present day have to uphold and continue.

The War College course enlarges our earlier study of international law by a course of lectures and by study and discussion of special topics, all conducted by Professor George Grafton Wilson. For many years, also, the War College has issued to the service, annually, a publication of one or more topics of international law, valuable for information and reference and often of absorbing interest.

POLICY

The study of international law shows at the outset that the international community of nations differs radically from the domestic community of individuals in that no superior authority exists to enforce the compliance of a nation. As the earliest activities of individuals grew and expanded, the need arose for some regulation of them, and so government was instituted, to the end that causes of conflict in the community might be avoided, individual rights as well as common rights protected, the general welfare promoted, and differences that were otherwise irreconcilable might be settled by judgment, with compulsory compliance. Among the individuals of a nation the power of government prevails over conflicting interests, but among the members of the world community, a superior power disposing of the means to compel a nation does not exist, so that any conflict of interests between nations must be settled by agreement or by preponderance of force. A nation's activities have in the end to conform only to natural law, and as this law is not codified nor always

determinable, and as nations do not knowingly embark on a course leading to war unnecessarily, the Government has need to be well informed about other nations. All are in the field together, claiming equal right, with no restraint other than voluntary agreement by treaty, the moral influence of international law, and the limitations of their own powers.

Strictly speaking, other nations are concerned only with our external affairs, but in these days of wide and growing international communication and intermingling in matters of all kinds, it becomes more and more difficult to draw the line between what is external, what internal. The separate jurisdictions of national and of state laws in this country, for instance, have on more than one occasion brought matters which seemed to be exclusively domestic into considerable diplomatic prominence. The lynching of some Italians in New Orleans in 1888, and the more recent Japanese school question in California, are cases in point. So also with a new industry whose product is at first wholly absorbed by internal demand. When it expands and enters the export field, it comes into competition with other nations and affects their economics. Thus, as a nation's activities grow, other nations become more and more concerned in them, with the possibility of conflicting interests in the future.

Racial origin and temperament, geographical location and configuration, natural resources, and political and social organization are the most powerful factors in determining the course and destiny of a nation. These fundamentals are either unalterable or else so deep-rooted as to be susceptible of change only gradually. Their combined effect is so compelling that, while contrary action may retard or for a time divert a nation's natural development, irrepressible natural forces will in the end prevail. This is the meaning implied in the term "manifest destiny," examples of which are found in our own history. Thus, the manhood and enterprise of our settlers west of the Alleghenies made it impossible for the great outlet of that region, the Mississippi, to continue under alien control. Later, the powerful cohesive tendencies of common race, temperament, history, territory, and intersectional interests have, in spite of prolonged and bitter civil war and its aftermath, solidified our people as one nation. Likewise in Germany and in Italy, the many small states kept apart

for years by artificial means finally overcame the separative obstacles and then these countries became solidified into the powerful nations of their destiny. Thus men, races, and nations are creatures of the forces of nature, which can be guided, governed, and developed, or for a time restrained, but essentially altered only slowly.

Policy, sound national policy, may be defined as a practical, wise course of action contributing to the nation's welfare, and it is evident that to shape a nation's foreign policy is not a matter of free choosing but rather the discernment of the natural causes which underlie the national interest in question. And in every case the policy framer must take into account the other nations that may be affected. The Government must consider whither a contemplated policy may lead, and as there is no superior control, the guiding, and if necessary restraining, function must be exercised by policy, which is a form of national self-control. And so, before settling on a policy the Government should examine into the probable causes of conflict with the interests of other nations, the importance of those interests to the foreign nations concerned, the probability of their opposition leading to a resort to arms, the interests of third parties that may be affected and their probable attitude, and, in the event of war, whether our means are sufficient to insure success, the cost of such a settlement, and the net result in gain or loss—not from the material standpoint but gain or loss to the nation in its world position.

Upon such an investigation, a Government could always proceed with confidence were it not that popular support is necessary. The problem is complicated by the fact that popular majorities consist largely of those who are not well enough informed to decide intelligently what the nation's policy should be. They expect the policy pursued to be appropriate and stoutly maintained even without the requisite force to rely upon, this difference between what should be and what is making the statesman's task more difficult, calling for knowledge and skill of the highest order.

To shape and pursue a successful policy is thus a higher art than mere governing, since it is the art of governing to advantage in competition with other nations. Education and training in administration might suffice for mere government, but the main-

tenance of sound policy requires a knowledge of the world, past and present, and such knowledge should include an intelligent grasp of the function of the military branch of the government. As Spenser Wilkinson says:

> The policy of a nation must of course bear some relation to its strength, which depends upon its resources and the excellence of its administration, but the strength with which a foreign minister is more immediately concerned is that of the army and navy. *(War and Policy,* p. 8.)

The military branch must not be a thing detached, to be thought of only when war is imminent. The country's readiness to meet a forcible challenge of its foreign policy should always be kept in mind, and the statesman, as far as he can bring it about, should maintain the nation's military preparation in strength and character appropriate to the support of the nation's policy. The German army and the British navy are striking examples of this principle. What it is in the nation's interest that the nation's military power may have to contend for can be answered only by the statesman. He more than any other is concerned in there being military power ready and adequate for any probable needs, for this is provision against forcible interference with the nation's lawful rights, lawful by nature. What those rights are and where, by whom, and when they may be forcibly contested are questions for the statesman. If any probable development of the national activity is likely to encounter greater opposition of force than there is military power to overcome, the course of prudence is to divert those activities into other channels or, if that cannot be done, if the activities are essentially right and just for the nation and especially if they arise from strong natural impulse, then they should be restrained until the requisite military backing has been prepared.

The United States has from time to time held policies of direct effect on affairs of foreign nations. Our earlier shipping policy fostered the American merchant marine at considerable loss to foreign carriers. Our tariff policy has varied considerably, each change affecting foreign industries and commerce, sometimes to their advantage, sometimes to their loss, but always necessitating some readjustment. Others of our policies have long stood without material change, such as the Monroe Doctrine and Asiatic

Exclusion. Of late years, the Open Door policy in the Far East has come to the front and as this bears not only on trade but also on the integrity of China, the matter has acquired broad proportions, requiring deep, far-seeing consideration.

Policy is studied in the War College by reading, lectures, and in writing of theses. Reading and consideration of policy continue throughout the course, being inseparable from the proper study of other subjects. The solution of problems brings out effects of various policies and reveals possibilities, desirabilities, or the actual existence of policy in the making, which throw additional light on our own interests and policies.

STRATEGY

How to determine the military power that may be necessary to uphold a given policy against challenge brings us into the field of strategy. Policy and strategy look to the same end, strategy answering the question how to do what policy requires in case of resort to arms. Policy aims to attain its object peacefully, if possible, but when that object is important enough to fight for, the means to attain it change from the milder form employed in peace to the stronger form of war. The object in view remains the same. Thus, war is the continuation of policy by the strongest means.

The Monroe Doctrine, for example, indicates the means to preserve from hindrance the development of the principles of living which brought about the predominance in America of the Anglo-Saxon race. The same result might have been achieved or at least aimed at by other means but the exclusion of foreign control is undoubtedly the surest course to maintain American ideas in the ascendant in this hemisphere. It guards against possible trouble growing by preventing any seed from being planted. This doctrine we have more than once upheld with more vigor than usual in diplomatic dealings. After the Civil War, France was given to understand that her forces and interference in Mexico must be withdrawn. In 1895, over the boundary dispute between Venezuela and Great Britain, this country declared an attitude of grave concern unless Great Britain should agree to arbitrate. In the Mexican case we were strong enough to compel the compliance of France, but in the latter case we were

far from strong enough to coerce Great Britain by arms. It was probably estimated by both parties, however, that the friendship of the United States was of more value to Great Britain than any gain in Venezuela—and she acceded. Thus, in serving the national aim—to grow according to our own ideals, free from alien interference or menace—the Monroe Doctrine formulates a strategic decision expressive of national attitude and action. Hands off or we fight. So considered, the necessity becomes evident to study the strategy involved, the means to give effect to the Monroe Doctrine.

In studying any questions touching exterior interests, it is imperative to know the possibilities of conflict and opposition, the consequent demands and the resources to meet them. In cases where there may be more than one course of political action open, the strategy involved by each course under consideration should exert strong influence upon the final choice of policy. Where, on the other hand, the formulated policy is forced upon the government by deep-lying popular feeling, as in the case of Asiatic Exclusion, the strategy involved by that policy should receive the early and careful attention of the highest statesmen. Strategy is thus the "look" before the "leap" of policy, but where policy exudes in crude form from the popular will, strategy comes as an afterthought, with the extra risks, difficulties, and costs usually attendant on afterthoughts.

Strategy in its highest sphere determines where, to what exent, and for what specific purpose military force shall be employed or manifested in pursuance of the nation's policies. This lies in the province of the national headquarters—with the President and Cabinet. The weighing of the risks and costs of national action, contemplated or already undertaken, must be followed by decision and commensurate preparation, lest the result be all cost with failure. Here there must be mutual working of political and military considerations. Statesmen must take military considerations into full account in their deliberations on exterior affairs, and reciprocally, military authorities, in executing military operations and advising on large military questions, must comprehend the political significance of their undertakings. Nothing could be more misleading or more liable to miscarry a large operation than to advise or to act "from the purely naval point

of view," as if it were or could be a thing apart. On this account, no directive body can wisely govern without military counsel of the highest order, and no military commander can succeed without understanding the end in view, political as well as military. Corbett states two vital principles in making war—one is the importance of admirals fully understanding the political significance of their orders and the other, the importance at headquarters of familiarity with the elementary principles of strategy.

The Army and Navy Departments of the government take the decisions of higher strategy as military policies to be carried out. Higher strategy may decide that to uphold the Monroe Doctrine we must be supreme in the Caribbean. And to control the Panama Canal we must be supreme in the Caribbean. And to be prepared against resistance to Asiatic Exclusion we must hold Hawaii, to do which (until Pacific Coast bases are adequate) means holding the Canal, and hence supremacy in the Caribbean. Thus, holding the Caribbean, the Canal, and Hawaii, are determined as cardinal military policies, and the requisite means for their achievement are worked out in the sphere of military strategy, by the War and Navy Departments.

Military strategy must take account of all elements affecting the international difficulties that may possibly develop. Not only our own policies but also those of other nations point where to look for possible trouble. The effect of these policies on the international situation as a whole is the true criterion by which to measure the military effort necessary to prepare. Mere numerical superiority in the theater of operations against an enemy is an insecure standard unless complications or pressure in other quarters are adequately provided for. Bismarck was careful to insure the neutrality of other nations before the wars of Prussia against Denmark, Austria, and France. When the Monroe Doctrine was promulgated, this country was in no condition to maintain it if challenged, but the international situation sustained it. Again, when the French violated that doctrine by going into Mexico, we were too occupied to resist with force until the Civil War was over.

A firm grasp of the true nature of the national purpose is necessary to determine where and how military effort will be effective.

The basic principle of successful strategy is concentration of all effort, high and low, on the end in view. Concentration demands the right kind of effort—whether a strong and vigorous offensive, to strike hard and quick before the enemy is in full strength, to deny him time and opportunity to concentrate and complete his preparation and defense; or a defensive course, to gain time ourselves, to wear the enemy down or to put upon him greater effort; or the mixed form of offensive-defensive, to hold what we have, harass the enemy, break up his combinations, and so wear away his power to continue.

An offensive course, for instance, may fail where a defensive attitude would have easily succeeded. Corbett derives a principle from Admiral Byng's unfortunate experience. "Better than taking the offensive yourself is to force the offensive upon an enemy who is too weak for it." These two principles marked the general course of the British grand fleet in the late war. The German fleet could do no great harm while confined to its own coast. For the British fleet to have gone in after them would have been very costly and probably disastrous. By not doing so but instead maintaining a position in readiness to rout the Germans, the offensive was forced upon the weaker German fleet, should it attempt more than guard its own coast. Mahan writes: "In war the defensive exists mainly that the offensive may act more freely." Trained judgment will perceive the course which tends most for concentration of effort towards the main purpose.

The degree of force and the kind and theater of its operations having been determined, in pursuance of the national policies, the next step in strategy is to prepare the force and the supports for its employment. These preparations include plans, personnel, training, material, bases, and supplies. In our War College studies, problems in strategy are based on an assumed general situation which is known to both sides and a special situation for each side known only to that side. These problems are made as realistic and as true to possibilities as permitted by the data at hand derived from experience. The qualities of existing types of vessels and weapons and the strength and composition of existing fleets are used. In this way the problems serve to develop, along with understanding the principles of the art of war, facility in applying them to the forces of the present day. These studies

sometimes bring out the desirability of new or modified types or greater numbers of existing types, or other apparent improvements, and the problems afford a ready means of testing such proposals before laying out money on actual experiment in service.

Plans for operations lead directly to the consideration of building programs and repair and docking facilities, to the supply and training of personnel, the maintenance and training and mobilization of reserves, to the establishment, security and stocking of bases, and to the acquirement and transport of supplies. This leads us into the sphere of logistics.

LOGISTICS

By the term logistics is meant the moving, supplying, and refitting of the fleet in the best order and security. The two prime requisites of military force are power and mobility. Power does not vary, assuming proper upkeep, but the means for mobility consume away. The mobility of a naval force is perfect *for a time,* but that is limited by the fuel radius. A force is *productive* in a military sense only while it is employed actively against the enemy, and the larger *the proportion* of the whole force that is actively employed at one time, compared to the time spent and the strength kept idle while refitting, the *greater is the efficiency* of the logistics. To save a day in the turn-around of a supply ship may seem a small matter, but multiply that by the whole number of supply ships employed and we save one or two whole convoys, thereby reducing the amount of escort duty to be done and correspondingly increasing the force available at the front. Hence, any increase in skill and pains applied to logistics is felt directly at the front, through enabling *more force* to press actively on the enemy.

The logistic requirements for war vary according to the location of the principal operations. The elements influencing such variations are:

(a) The distance of the theater of operations from the home coast;

(b) The possession of secure advanced bases;

(c) The availability of positions suitable for advanced bases;

(d) The direction and distance of sources of supply;

(e) The material resources of the belligerent's own country;

(f) The number and location of available lines of communication;

(g) The degree of preparation existing during peace.

The elements of the enemy's logistics also influence our own, because his facility or difficulty of operating calls for greater or less effort to overcome him, thus affecting our logistics indirectly but surely.

No proper grasp can be had of the large problems of strategy until one has examined into the logistics involved in one of them. Not alone fuel, water, food, and clothing, but also general stores, base equipment, repair ships, hospital ships, ammunition ships, tenders of various kinds, sweepers, surveying vessels, patrol vessels, and troop transports—all may have to be provided for, prepared, organized, grouped, assembled, routed, turned around, and got back home for another load. It is a vast undertaking to maintain a large force overseas—in one problem 30,000 tons of shipping required to arrive every day.

The study of problems in support of national policies brings out requirements and existing deficiencies. It shows the need of bases, the need to acquire them and make them secure during peace. From a salient base already in possession, the fleet may at once, by an active course, prevent or neutralize the gain which would otherwise accrue to the enemy through delay on our part, if we first had to obtain a base—with all the attendant hurried effort and loss of time in preparing an expedition, with possible neutrality complications and exposure to enemy attack while seizing the base.

A military force is supported by its communications, which Mahan calls "the living connection with the national power." When the arteries are sound, activity may be daring and of robust vigor, but when the life channel is precarious, activity is gripped by invalidism. For communications to be reliable, the bases must be secure, and unless their security is independent of the presence of the fleet, the fleet is half paralyzed. "A fleet charged with the care of its base is a fleet by so far weakened for effective action—weakened both strategically and tactically." Insecurity of the

base is as fatal to vigor as a weakness of the heart. The fate of Port Arthur and of the Russian fleet based on it is a terrible example.

Our own fleet made a notable long distance cruise around the world in 1907-09, with resultant influence on the subsequent development of a train. Another cardinal practice of ours, self-upkeep and self-repair of ships in the fleet, is of the greatest value. These are long steps towards good logistics in war, but the study of logistics shows that these are only the beginning, and that the problem which might confront us in war would demand the utmost of every officer in keeping his weapons bright. All will do this the more surely through some effort on their own part to understand its meaning to the nation.

CONCLUSION

From the foregoing outline it is seen how international law, policy, strategy, and logistics are woven together in one great study for the welfare of the nation. By reading history, biography, and books on the large problems and prominent topics of the world's life, one acquires the power to see events in their real significance and to form sound opinions of one's own. The college courses and other exercises conjointly with other officers, point the way and help to keep one on the right track yet not in a rut, but most of all must officers depend upon their own efforts, keeping in mind the purpose of all our training and effort—that the naval commander and the naval force, in every way and every situation, shall be equal to the task.

The great names of naval history were men of large general information and knowing insight in international affairs—St. Vincent, Rodney, Nelson, Farragut, to mention only a few. Nowhere does "knowledge is power" apply stronger than in the navy, and it is obvious that the power of the leader to act to best advantage is greatly enhanced by broad-minded, well-informed grasp of the situation by his subordinates.

Rear Admiral H. C. Taylor, an early president of the War College, an officer of wide reading and experience, recommended young officers to read Mahan again and again, adding, "put it under your pillow." In a recent number of the NAVAL INSTITUTE, our Vice Admiral Knapp urges officers to acquire the international

outlook. Only reading and study will lead to that, with real intent to read, mark, learn, and inwardly digest—the reflective kind of reading, which stocks the mind with information and develops the ability to apply it. Officers who form this habit of serious reading find it refreshing as well as profitable. By means of it you will surely advance yourself towards real fitness for that occasion when the situation may suddenly tax your utmost abilities. Then, if prepared, you may demonstrate, with the world looking on, that indeed, knowledge is power.

[COPYRIGHTED]

U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

A FIGHTING LEADER FOR THE FLEET

By Lieut. Commander R. K. Turner, U. S. Navy

Napoleon postponed his visit to England until July, 1815, because he was not possessed of the "seaman's eye." A correct view of the way to Britain from the continent cannot be gained by a man who has confined his activities to shore, since it leads across a bit of water whose management is only possible to one familiar with ship and the sea. The genius who reorganized France during the Hundred Days was unable to effect a combination to baffle the storm-tossed Nelson; to control Nelson's element required, not a Napoleon, but a greater Nelson. Had Napoleon been an admiral he would have succeeded in reaching England, but his success would have been gained with the methods of a seaman and not with those of a soldier.

Those who spend their lives on shore are not fitted to solve the problems of the sea, since at sea through countless years have grown up certain customs in the conduct of affairs, the results of necessity, that are quite different from those obtaining in analogous situations ashore. The seafaring man has, in fact, methods of his own for accomplishing his ends that are peculiar to the sea and for which methods suitable enough for work on land cannot be substituted without detriment. These customs, these methods, exist alike for the prosecution of warfare as for the business of peace.

The principles of war are few, easily learned, and correctly put into practice with only the greatest difficulty. These principles apply equally to war on the land, in the air, on the water, and under the water and even their correct application in the most widely different circumstances does not change as regards men

Note. This article was written in October, 1921.

but only as regards changed weapons and conditions. Thus warfare on land and sea today is, except in details, like it was in the days of Hannibal and when Antony fled from Actium to his doom. But the detailed application at sea of the few great truths of warfare differs from their application ashore, and largely because the vastly superior means that exist at sea for transporting the fighting forces and the resulting speed with which unexpected situations develop requires leadership to be exercised in an entirely different manner in the conduct of the affairs of fleets than in the direction of those of armies. The tradition of the sea is the fighting leader commanding the fleet from a fighting ship and exercising a personal control whether of strategical operations or tactical movements in battle that has in the case of shore forces necessarily been delegated to subordinates by the general in command. Napoleon from the shore at Boulogne attempting to effect, with the same methods, the concentration of an army and a fleet, and from a position distant from this fleet essaying the exact direction of its movements, displays his lack of appreciation of the correct use of that weapon. Because his unfamiliarity with the sea made him fail to realize the importance of the element of personal command by his admirals, the greatest soldier of the age could not, in two years' time, absolute master of the continent as he was, cross the twenty wet miles of Britain's frontier.

Successful war at sea has in the past been waged by seamen with seamen's methods; in the future seamanlike methods will gain like results. The study by seamen of war rightly includes both land war and sea war, but while our libraries abound with books on land warfare, from strategy through tactics to detailed organizations of staffs and the varied forces, we have but the bare outlines of accomplishment recorded for the sea warriors. Even Mahan's writings, dealing almost solely with strategical considerations, throw us on our own resources as regards tactics and organization. Therefore we turn to the many German and other writings on staff activity and training, and hunt through voluminous reports and charts of the late war in the course of study. Not content with the British system, since, in the only sea battle of first importance, it (or something) failed to produce satisfactory results even with overwhelming forces, we attempt to adapt the devices of the soldier to the solution of the problems of the

sailor. Rather should their solution be guided by sound thought and by study of the battles of former masters of the sea. Nor may we blindly accept their methods where these are susceptible of improvement; on the contrary they must undergo such modification as experience shows will give effective results. But we must take care that in hasty change we do not discard any of the *fundamentals* of three thousand years of practical war.

One of the changes that is popular at the moment concerns an increase in staff functions and the centralization of detailed staff control under the personal direction of the commander-in-chief. Under this plan that officer is relieved of direct command of any part of his fleet. Following adoption of the German method we have seen the armies of the world transformed by staff control into closely knit organizations having an efficiency undreamed of a few years ago; it is inevitable that there should be an increasing agitation to extend this system to the navy in order to gain the same benefits that have accrued to the army.

It is certain most naval officers feel a hearty sympathy with any agitation which will assist in creating the centralized authority and decentralized initiative that will win battles. There is one phase of this movement, however, that contemplates a change savoring too much of the camp and too little of the quarterdeck. Doubtless it is the example set by the German Great Headquarters Staff that is responsible for the recurrent demand for a special flagship for the admiral, which shall be devoted wholly to his service. This demand is not entirely new, and at one time in the recent past there was wide discussion of the tentative plan for a heavily armored, practically gun-less vessel for the purpose of carrying the flag at all times, even during battle. At the present time we hear no more of this plan because of the wave of economy as regards military matters, but instead we behold the admiral of the United States fleet embarked upon an unarmored, practically unarmed vessel, the *Columbia!*

The *Columbia,* formerly an army transport, and not designed for her new use, is designated as the "Administrative Flagship" of the fleet, while the *Maryland, t*he newest and most powerful of our battleships, is termed the "Tactical Flagship." The latter, when the admiral is not embarked on board, will take her place as one of the units of a division for ordinary tactical and admin-

istrative purposes. The present view as to the employment of the *Columbia* may then be presumed to be that under normal conditions of peace, and for about nine-tenths of the time, the commander-in-chief and his staff will perform their functions on board that vessel. During combined maneuvers, both in peace and war, the admiral, with a certain number of his staff, will take up his station on the *Maryland*. With this scheme it is obvious that the *Columbia* is not likely to be used in war as a tactical flagship, if only because of her vulnerability to attack while at sea.

In any discussion of this matter we can not ignore, however, the former opinions of many members of the service who felt that experience and study showed the desirability of the above-mentioned heavily armored and gun-less flagship for the use of the admiral in the actual tactical direction of battle. It appears that the idea back of the present administrative flagship, the *Columbia*, is a development of the previous scheme, and doubtless we may expect to see, during maneuvers, that vessel occasionally used as the tactical flagship if only for the purpose of demonstrating how a battle may be conducted from a ship not engaged in fighting. If such a demonstration shows promising results it is more than possible that the old agitation for a combined administrative and tactical non-combatant flagship may be renewed. Therefore in any discussion of the present "Two Flagship" system we should at the same time go into the older question of whether or not a special tactical flagship would increase the efficiency of operation of the fleet during war.

The reasons that influence those favoring either the "Special Flagship" or the "Two Flagship" system may be grouped together as follows:

(a) The existence of the varied forces of modern warfare requires that the commander be in such a tactical position as will allow him to give consideration to all, and not alone to the battleships. It is argued that the admiral, embarked on a battleship in the line, sees only the ships about him and loses touch with the cruiser force, the destroyers, the submarines, and the aircraft.

(b) The smoke and noise interfere with the transmission of signals. It is said that a ship behind the line can send signals with greater certainty than if in the line itself. In addition, it is

assumed that signals can more easily be exchanged with the other forces.

(c) The admiral, since his ship is neither firing nor is close to other ships that are firing, can, it is said, gain a better view of his own and the enemy's line and thus be better informed as to the tactical situation.

(d) Since a battleship is built for the definite purpose of fighting and must carry a full complement for ship operation there is insufficient space for a staff as large as desired; both the staff and ship facilities are thus improperly reduced. With a ship built only for the admiral all the staff functions, now sometimes either curtailed or performed in other ships, can be collected and a thoroughly efficient organization provided.

(e) In peace, or while the flagship, if a battleship, is cruising for primary training, both the ship and staff are unavoidably hampered by the necessary duties of the other.

(f) During peace, or in war when operations cover a wide area, the admiral must be able to inspect and supervise the work of scattered forces by paying personal visits to all units. He must not be tied down to the battleships alone, but it must be possible for him to be absent from his major forces for weeks or even months; it is necessary, therefore, for him to have such a vessel as will carry his entire staff.

It would seem that the recital of these arguments would indicate answers sufficiently powerful to defeat the whole project. Such has not, however, been the case, since, although the original idea of the special tactical flagship has been abandoned, the compromise represented by the *Columbia* has been accepted. Before combating these arguments put forth to support a device copied from the headquarters organization of the land forces, it will be well to examine more fully into some of the essential differences between the problems confronted on land and at sea, in order to appreciate the very good grounds that exist for the differences between the organizations as they have been up to the present.

In the first place, land battles are local, their movements and developments taking place very slowly, while at sea an action is fought at full speed, miles are covered in a few minutes, and the trend of success or failure develops very suddenly. The

time element at sea is of so much greater importance that it cannot be too greatly emphasized. No fire superiority on land, except in case of complete surprise, can possibly be so great that the action may be decided by it alone within a few minutes. At sea, five or ten minutes' decisive fire superiority may well mean a great victory. The admiral must estimate a situation, decide upon his action, and see to its execution, all within a very few minutes; under such circumstances it is upon his own judgment of the moment that he must rely, a judgment comparatively uninfluenced by staff or subordinate advice, but formed instantly as a result of personal observation, previous study, and experience.

The amount of staff direction prior to or during combat, so necessary on shore, is not required at sea. Land battles on a great scale often occur after weeks of planning in great detail for the tactical use of an army over a particular and well known terrain. The conditions most likely to develop are assumed, special plans are made to meet them, and the result often depends upon close adherence to plan and the correct use of a large tactical reserve. For this reserve particular arrangements must be made both before and during battle. At sea there is no tactical reserve under ordinary circumstances and after the battle is joined: both admirals endeavor at the earliest moment to bring their full force to bear. Nor can the exact locality of the action be known far ahead of time, nor the direction, the formation, the course, nor the strength of the enemy; the battle must be fought under the influence of a general and flexible doctrine supplemented by maneuver orders only. No such thing as the definitely fixed and co-ordinated plan of the army, requiring staff work on a large scale, will ever exist for the navy. The movement to the battle line of new troops, supplies, and ammunition does not take place at sea while the fight continues because they are already present and so this matter requires no special battle orders. Even admitting that it is necessary to enlarge the scope of naval staff work, it is difficult to see how it can ever reach the proportions to which some persons, impressed with the army organization, believe it should grow.

The modern battle lines ashore that extend for many miles in front and depth owe their existence to the development of rapid

communication secure from interruption. The commander-in-chief is in touch with all parts of his army through his headquarters organization, and his battle decisions, made after a study of many reports and recommendations from his subordinate commanders and staff, are made from a view of the map alone—a personal view of the battle may even lead to false conclusions, since the whole field cannot be seen by one man. This personal view of a sea battle is admittedly the first essential for an admiral, and the many tactical decisions he makes are necessarily the results chiefly of impressions rather than a long series of information reports. Such reports are fragmentary and slow in reaching their destination because of the meagre means for communication, subject, as it is, to constant interruption. The transmission of information, while of vast importance, is notoriously unreliable and can never keep pace, in rapidity, with the development of the action and the necessity for quick decision.

One need have little discernment in reading history to note that the more or less flexible command exercised by the commander-in-chief of land operations is entirely different from the very close personal command of engaged forces exercised by an admiral commanding a fleet. This characteristic difference in the past must not be ignored because very good reasons require the use of each method in its own place. This is not to say that great sea battles have not been fought when the commander-in-chief was not present, but in such circumstances the supreme command of the action has been out of the hands of the commander-in-chief and the entire responsibility, initiative, and execution have been with the commander actually with the fleet. We cannot alter the fact that the commander at sea has always been the fighting leader. The most notorious case in history of a commander-in-chief in a flagship separate from but near the battle resulted in fresh laurels to Nelson at Copenhagen. Here the fighting leader was, as always, in the thick of the fight, and the name of Sir Hyde Parker, his commander, is forgotten because of his small influence upon the event. Nelson invariably planned his actions to win and wished always to be on the best fighting ship and in the thickest of the fray where he knew victory was to be found. At Trafalgar he was urged to hold his flagship back from the fight; he had a splendid opportunity

to remain on a fast sailing frigate out of the line and thence to direct the battle. He chose instead to lead the left column straight for the enemy's center because he was a fighting and not a non-combatant admiral.

The answers to the arguments for a special flagship thus suggest themselves. As to (a), the reason the admiral places himself on board a battleship is because the battleship force, combining both infantry and artillery, with ability to take and give hard knocks, is the force which wins the victory. These vessels will always be at the tactically important center of the action, and it is essential that the admiral, whose decisions necessarily flow largely from a personal view of the action, must be where he can keep control of the controlling force of his fleet. The other forces are important for subsidiary uses, but the battleships must be employed for the decisive work whether he aims to destroy the enemy or to save his own fleet. If he wishes merely to frighten the enemy, to baffle him, to evade him, or to cause him minor damage, the other forces may find larger active use than the battleships, but if he is seriously in earnest in his desire to do the enemy harm, the minor forces but prepare the way.

Since radio signals are used almost to the exclusion of visual methods, the argument set forth in (b) falls flat. Even with visual signals, it is entirely a matter of wind direction whether they can more easily be seen if the flagship is in the line or out of it. This reason, advanced some years ago when the special flagship idea first appeared, has no longer its former potency.

As to (c), it is, of course, impossible to watch the enemy better behind the line than in the line, and it would seem a matter of considerable importance to see exactly what the enemy is about at all stages of the battle. It is certainly of more importance to see the enemy, and to see our own ships that lie between or flanking the two lines than to view the unengaged side of our line and our other vessels that are altogether out of the action. If the wind is blowing from the enemy toward ourselves, the smoke will shut off the view from a flagship behind the line not only of the enemy, but also of all our own forces. Ideas as to the progress of an engagement gained from such a position would probably be erroneous.

The statement in (d) is, however, one that cannot easily be passed by. It is quite true that the ship's complement and the flag complement are both crowded and hampered by each other, but these unfortunate conditions have been accepted in the past without any great effort having been made to overcome them. The question of quarters is important, but since, in the opinion of many, the present officers' staterooms on board can be reduced in size without any great sacrifice of comfort, and additional rooms more habitable than those on many smaller ships can be built, this crowding can, with some care, be partly reduced and partly accepted with small loss in efficiency. As the number of enlisted men required for the flagship is only slightly greater than for a battleship, the question of their billeting is easily settled. As to the staff functions now performed on other ships these are, in fact, minor, and it is difficult to see why in any case there need be a fleet marine officer, a fleet supply officer, and a fleet chaplain attached to the staff of the commander-in-chief. There are few marines afloat except on the battleships, and the battleship force marine officer could, it is thought, combine his duties with those of the fleet marine officer. The fleet supply officer now seems out of place and should be on the staff of the commander of the train, while the fleet chaplain could perform his duties as well on any other ship. It is possible that a scrutiny of the existing staffs would disclose that other positions might be abolished and so allow room for the desired increase in staff officers of the line whose duties would be wholly military. In the past, in the navy, staff officers have been regarded as luxuries, and adequate quarters, offices, and battle stations have not been included in the designs of flagships. Suitable facilities of this nature should be provided, however, even if at the expense of reducing the actual fighting efficiency of the ship.

So far as (e) is concerned, it is probable that all of the duties required of the admiral's staff can be performed as well at sea as in port. Urgent communications with other stations are sent by radio, while others can wait for the mail tug which visits the flagship daily unless the latter is well out to sea. It assuredly isn't desirable, as one officer expressed it, to "set up a little Navy Department at anchor in Hampton Roads," and sea cruising is

equally good, as a matter of battle training, for staff as well as for all other naval officers.

The reason set forth in (f) appears as important as (d). It is undoubtedly a fact that if a battleship is the only ship an admiral has at his disposal he will largely be prevented from paying those personal visits to the various forces that add so much to military efficiency. This is particularly true at present, when the fleet is scattered to the winds, with detachments all the way from Hawaii to Boston. But are we not attempting to correct the faults inherent in such lack of concentration by an equally faulty device? By all means let the admiral have a suitable tender for his own use—even the *Columbia*—but his actual flagship, the ship in which he cruises and where his staff functions should be the battleship in which he will some day fight. What is to prevent the real flagship from cruising this year in the Atlantic and next in the Pacific, and why can't the very small number of inspection trips by the admiral (once a year to Newport and Charleston, or Panama and Hawaii) be made in his tender? In any important war involving the United States it is not probable that the commander-in-chief will make extended trips away from the battle forces in such a vessel as the *Columbia,* while he will doubtless make short trips in a destroyer. Therefore this reason is not so important after all, particularly if the policy of yearly fleet concentration and maneuvers is carried out.

The errors that have arisen in considering this question are doubtless due to a misconception as to what really constitutes the fleet. We look upon the fleet as made up of a collection of forces composed of vessels such as battleships, cruisers, destroyers, submarines, and aircraft. In this we are wrong. In any war in which the United States will seriously rely for success upon its fleet that fleet will consist of the battleships—with numerous other craft *to assist* the battleships in carrying out their mission. The battleship force *is* the fleet; it is the force with which victory will be won, *and all the other forces will be used merely for the preliminary work and to make ready for the effective use of the battleships.*

Any device that takes from the commander-in-chief his power of using the battleship force with instant facility for gaining

his ends is fundamentally wrong. He should, indeed, be its immediate commander, and whatever organization is necessary to relieve the admiral of administrative details should never be allowed to separate him so far that he will cease to be the actual tactical commander of that force. The battleships will decide the day in our future naval actions, and since no argument will ever displace that fact, then we should at once admit that the place of the admiral, the responsible leader, is with those vessels *at all times*. It must be in his power to employ them as he sees fit, and this he cannot do if he is in a special flagship miles away at the decisive tactical moment.

It may seem at first sight that the present "Two Flagship" system will meet these requirements, but further consideration will show that many of the disadvantages of the "Special Flagship" system have been accepted, while most of the advantages of the normal system have been discarded. This apparently is the proposal of those who, being unwilling to go the whole way, would stop in the middle; unable to cross the river at one jump we would make it in two, which will be fatal if the flood of war catches us in mid-stream. The whole movement stops but one step short of the old British system that allowed the commander-in-chief of the battle fleet to hoist his flag on his house in the dockyard.

Let us suppose that two years hence we engage in a war in which the employment of our battle fleet is required a short time after the declaration. Also let us picture what will happen if the "Two Flagship" plan persists until that time.

This year, because of lack of funds, there will be no joint maneuvers and the *Columbia* may be expected to remain in the Atlantic. The admiral and his staff will therefore be unable to direct the tactical handling of a battle line of our most important vessels, which are in the Pacific, at least until next year. After these maneuvers the admiral will then return to the *Columbia* for another year, at the expiration of which we assume that war breaks out. If the fleet has already been concentrated, we may then expect the admiral to take up quarters on the *Maryland*, in view of the imminence of a capital action. However, he may elect to remain with his entire staff on the *Columbia* while in port.

going aboard the *Maryland,* with a few assistants, only when the fleet puts to sea.

When he goes to the *Maryland,* which meanwhile has been exercised as one of the units of a division, whom will he take along? Will the entire administrative staff go, or just those officers concerned with the tactical handling of the fleet? The former plan can not well be followed if, as has been stated, the staff is too large to add to the personnel already on a battleship. Then who will remain on the *Columbia* to direct the reduced "administrative" staff, and what will be the result, at the outbreak of war, of such a division of this staff?

The duties required of the signal and radio forces, the yeomen and the internal communication force are very onerous on board the "Big Flag," whether at sea during maneuvers or in port. These officers and men require careful training; the work performed by the similar personnel of an ordinary ship, such as the *Maryland* would be under usual conditions, is by no means so heavy or important as in the case of a flagship. When the admiral goes on board the *Maryland* at the outbreak of war will he take his own communication forces with him, or will he depend upon such a hastily organized staff as that vessel will be able to improvise? Will the routine communication work still be handled by the *Columbia* with a reduced force, or will it be taken care of on the tactical flagship no matter what distance separates it from the administrative flagship?

How many of the administrative files, reports, war plans, and other papers will the admiral take with him? Certainly some must go, because the *Columbia* can hardly be expected to go to sea with the battle fleet when an action is impending. Can all of the files go, in view of the fact that certain staff work is still to be performed on the *Columbia?*

When several officers from the Planning Division of the Office of Naval Operations join the admiral, will they go to the *Maryland* or the *Columbia?*

Some of these are knotty questions requiring careful consideration to answer, since upon the correct answer depends a great part of the efficiency of the staff and fleet. They are not, however, the really important questions.

Everyone knows the extraordinary amount of detailed drill required of both officers and men to keep a ship efficient in matters of fire control. Drills are held daily for the purpose of testing communications and training men to speak and hear over the telephone standardized words that have been reduced to a minimum by careful elimination. Fire control duties are all simple, and yet they require constant and unremitting practice in order that efficient co-operation may be attained. Simple duties in various parts of a single ship are co-ordinated by simple words —and yet what long hours of training this takes and how hard it is to keep the system efficient! Merely for the sake of keeping these simple affairs in order we require all hands to drill daily at their battle stations so that familiarity may bring perfection.

Such work is indeed simple compared to the work of maneuvering a fleet of varied forces. How then more necessary it is for the admiral's staff, and the admiral himself, to exercise at their vastly more important, intricate, and difficult battle duties with sufficient frequency to eliminate error! It is no more possible daily to maneuver a fleet than it is daily to fire a target practice, but it is of the utmost importance that each detailed duty performed by the staff in action be performed very frequently, *even daily*, so that the mechanism of command may run smoothly. The staff personnel should be as familar with their battle stations and their battle duties as are the ship's personnel—*their* telephones, and signal flags, and code messages, and plotting, and casualty drill are the most important in the fleet.

It was but a few years ago that the fire control personnel of a ship were few in number and exercised but seldom at their stations; the growth of our knowledge of what is necessary in the way of controlling a ship's fire has made us increase the number of men performing such functions until the complexity of the machine requires frequent operation of all its parts. Perhaps even yet we haven't realized that we need an even more intricate machine for the control of a fleet in battle, a machine that can be made efficient by one means only—hard work and frequent drill. These cannot be directed from the administrative flagship, but only in the exact surroundings, with the same facilities, and on the same ship where the admiral fights the action, so

that on the day of battle his staff may know the use of their weapons.

Furthermore, it is important that the battleships continue to look to the commander-in-chief for direction and for personal leadership. The habit of mind produced by frequent contact between the division, squadron, and supreme commanders will be a very important factor in an action. Indoctrination of this force with the ideas of its commander and the resulting unity of action cannot be attained except through the personal relation that has invariably had so great a part in the maintenance of the fighting spirit in successful fleets. The subsidiary forces, who do not fight under the detailed direction of the commander-in chief, require this personal contact to a less extent; this can be supplied at times of combined maneuvers or by special visits undertaken during periods of overhaul or primary drill of the battleships.

The battleship force should be handled as frequently as possible —every time it gets under way as a force—by the man who is to handle it in action. The Germans were long known to be very expert in fleet maneuvers, having attained their proficiency by constant drill. Is it to be supposed, with the present system of employing two flagships, or with our present tactical organization, that the United States Fleet will ever be able to perform so superb a maneuver as that of Von Sheer's in the battle of Jutland when, after two complete reversals of fleet course, he hurled himself, in emulation of Trafalgar, at the British center? Can we execute such precise drill unless we return to a system of active personal command that will allow such performance?

The British failure at Jutland cannot be laid to lack of administrative facility, for, as has been shown, their preliminary staff work up to the moment of battle was well-nigh perfect. The information sections, the planning units, the communication service, the guard and sweeping divisions, and the control of forces scattered over a wide area all functioned so marvellously that the Grand Fleet was brought to the correct meeting point with a smooth perfection that is admirable. Every precaution was taken, every contingency provided for; but the British failed to gain the decisive victory they so confidently expected. Success eluded them not because of defective ships, faulty organization, poor

gunnery, or lack of information, but because of ineffective tactical handling of the battleships.

It may seem necessary to distribute the detailed administrative duties connected with control of the battleship force, but these can well be taken care of in the squadron system of organization, which yet leaves the commander-in-chief as the actual commander of that force. In war it is extremely doubtful if the admiral will leave his battleships if their use is at all likely, and we should simulate in peace conditions that will obtain in war.

The logic of circumstances is against the older movement to put the admiral, during action, any place but in the heavy battle line and in the best position therein to control his most important fighting ships. It is unthinkable that he will remain in the line in any ship incapable of giving blows as hard as it receives, of taking but not inflicting punishment. Therefore the special tactical flagship idea will not persist. But the newer movement for the "Administrative Flagship" should not be accepted without very searching consideration. The subject has as yet received but little thought by the service at large, doubtless because it appears at first as not of major importance. Unless, however, we are willing for the lethargy of peace to allow this new plan to become a fixed institution that may plague us in war we should view the experiment with a critical suspicion that will be satisfied only in case of its unqualified success. The navy must have proper facilities for the conduct of its affairs both in peace and war, but, though the former is the normal state, the latter is the fleet's sole reason for existence; steps taken to increase our ease in peace must not compromise our effectiveness in war. The fleet must, in peace as in war, be directed by a fighting leader in a fighting ship.

[COPYRIGHTED]
U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

NAVAL REGULATIONS[1]

By Captain H. E. Yarnell, U. S. N.

In blocking out the course of instruction at this school it was decided to have a few lectures on subjects which concern us all intimately as destroyer officers before beginning tactical work on the game board and the instruction in scouting and screening which will come later.

After the lectures which you have already heard on "Handling of Men" and "Destroyer Seamanship," the present subject is in the nature of an anti-climax as far as our interest and liking are concerned.

However, in any organization, rules and regulations are necessary, and it was considered that an hour or so spent on those governing the navy might serve to call attention to their importance and lead the officers of this school to refresh their memories, and perhaps to a more careful observance, the necessity of which is obvious to all.

The present volume of *Navy Regulations and Instructions* is the growth of over a hundred years and is perhaps as good a measure as can be found of the great changes that have taken place in naval personnel and material in that time. Human nature is not subject to such great changes as is the machinery created by human ingenuity, and in the regulations relating to morals and conduct you will find fewer changes than in those relating to material.

The Articles of War for the government of the navy have changed but little in a hundred years. In fact they were originally

[1] A lecture delivered at the Destroyer Staff College, Charleston, S. C., October 21, 1920.

taken from the British Articles of War which dated back to Cromwell's time. I think you will agree with me that it would be difficult to improve the phraseology of the first eight articles. Yes, they contain in the brief space of three pages a complete code of all that goes to make the highest type of an "officer and a gentleman."

The first paragraphs contain the specifications of an officer. He must be "a good example of virtue, honor, patriotism and subordination." The writer of the Articles of War was evidently a profound student of human nature and consequently described at the outset what the qualifications of a leader should be. The mass of men look to their leaders for example. They expect their leaders to show themeslves bigger, stronger, and better than they are. Leadership implies superiority, and being better than other people carries penalties as well as rewards. A man must be eternally making good at it, or be stripped of his lace and reduced to the ranks in the minds of his followers, even if for the moment they are powerless to demote him physically. So, unless you set a high standard for the officers and men under your command you cannot expect to be a true leader.

The second Article recommends the attendance at divine services. While freedom of religious belief is part of the foundation of our government, it is not to be interpreted as encouraging atheism; and a naval service whose officers are Christian gentlemen will win in the rude shock of war over a service composed of atheists. Cromwell's praying Roundheads were unbeatable in battle.

The fourth Article enters into more detail regarding the standard of conduct expected in time of war or battle. I defy any master of the English language to improve upon the clearness, conciseness, and directness of expression employed in these phrases. Even when long words are used, they seem to be the only ones that express the meaning.

One of the phrases in this paragraph was responsible one hundred and sixty years ago for the tragic death of a British admiral who was shot to death by musketry on the quarter deck of one of his ships in accordance with the sentence of a court martial which found him guilty of not doing his utmost to capture and destroy an enemy fleet. I refer to the case of Admiral Byng

and his engagement with the French fleet off Port Mahon, May 20, 1756. In those days, the Articles of War did not contain the phrase "or such other punishment as a court martial may adjudge," but prescribed the punishment of death. Byng was found guilty, and as there was no alternative punishment, the court felt compelled to sentence him to death. The King refused to pardon, and the unfortunate admiral was accordingly shot.

This case of Byng deserves rather close study since the cause of his failure was not cowardice, but a too literal adherence to "Fighting Instructions" which combined with an ignorance of principles, kept him from engaging the enemy with his full force when once joined in battle. War and battle cannot be carried on by rules and regulations, but they can and must be carried on in accordance with principles which it is our task here to attempt to deduce for destroyer forces.

In paragraph seven we have more detailed specifications of the code which apply to both officers and men in both war and peace. I particularly invite your attention to paragraph two of this article:

> Such punishment as a court martial may adjudge may be inflicted on any person in the navy who is guilty of cruelty toward, or oppression or maltreatment of, any person subject to his orders.

If you look back over the court martial records of fifty or sixty years ago you will find a number of cases of officers in command tried for actual physical cruelty and maltreatment of persons under their command. Happily such cases do not exist today, but the implied obligation in this paragraph to see that every person under one's command receives justice is just as necessary today as it was a hundred years ago, in the great art of handing men.

Other paragraphs to which your attention is invited are paragraphs five and six of Article 20. Here is an Act of Congress which specifically provides that a commanding officer shall always supply a transferred man with his pay accounts and shall refuse to receive on board any man from another ship who is not supplied with the same. I dare say that this Article has been recognized

more in the breach than in the observance, especially during the late war.

Many of the regulations have a history behind them—sometimes tragic, and sometimes otherwise. If we had a record of what was the actual cause of their being written it would furnish material for a most interesting book.

Article 53 of the Articles of War prescribes that no sentence of a court-martial involving a death sentence can be carried into execution until confirmed by the President.

While not certain, I have the impression that this Article was the result of the mutiny on the brig *Somers* in the early part of the nineteenth century. In this case a midshipman named Spencer and two seamen were found guilty of a plot to seize the ship, murder the officers, and such of the crew as would not join them and turn pirate. They were sentenced to death, and the captain of the *Somers* immediately carried the sentence into effect. Spencer was a nephew of the Secretary of War and the case caused widespread comment at the time.

Article 845 of the Regulation which provides that force shall be employed to prevent search of a naval vessel or removal of any of her officers or crew by any person representing a foreign state is what we were fighting for during the war of 1812.

All of you can perhaps recall the circumstances that led to the insertion of Article 724, paragraph 2 in the Regulations. That was the demand for a salute at Tampico in 1914 by the senior officer present.

Articles 721—725 inclusive which prescribe the duties of a commander-in-chief or senior officer with regard to Intercourse with Foreigners are the result of years of experience and to all officers they are especially important. A recent letter from the commander-in-chief which quoted correspondence between the War and Navy Departments regarding the assumption of authority by a military attaché over naval forces in a foreign country is of interest in connection with the above regulations.

It must be admitted however, that to an officer in his first experience of protecting American lives and property in Latin-American revolutions, the above mentioned regulations will give little but negative assistance. First, he is enjoined to consult our diplomatic and consular representatives and "carefully and

duly consider any request for service from any such representatives." Usually in times of stress these representatives are more or less panic stricken, and are insistent that landing parties should be sent ashore at once.

Also the regulations are specific in stating that "the responsibility for any action taken by naval force rests wholly on the commanding officer thereof." This exclusion of responsibility applies to the Navy Department as well which must disavow the act of the commanding officer if such does not meet with the approval of the State Department or the President.

So it would appear at first glance that the naval commander in such circumstances is damned if he does, and damned if he doesn't and such may be the case.

The answers is contained in Article 723. When after a cool and careful survey of the situation, a commanding officer believes that lives and property of our citizens are in danger, he should take steps to protect them. Never err on the side of inaction.

It is not necessary to quote further examples of the historical phase of Regulations, but enough has been given to show that back of many of the Articles and paragraphs have been circumstances that required them to be included.

In *Naval Courts and Boards,* 1917, P. 7, we find the following:

> The Navy Regulations are next in point of authority to the formal enactments of Congress as expressed in the Articles of War and other laws found in the Revised Statutes, and the Statutes at Large.
>
> They comprise the administrative rules relating to the Navy and are authorized by section 1547 of the Revised Statutes, which provides that "the orders, regulations, and instructions issued by the Secretary of the Navy prior to July 14, 1862, with such alterations as he may have since adopted, with the approval of the President, shall be recognized as the regulations of the navy, subject to alterations adopted in the same manner."
>
> In naval matters the President speaks and acts through the Secretary of the Navy, and regulations issued by the latter are in legal contemplation of the regulations of the President. In some instances, the President expressly approves; in other his approval is implied; but the legal effect is the same, all regulations promulgated by the Secretary of the Navy being equally binding and having the full force and effect of law whether or not expressly approved by the President.

So our Naval Regulations are law for us, and as ignorance of the law excuses no one before the bar, it is up to us to know

the Regulations if we want to become good naval officers, or if we want to keep out of trouble.

Now for a few remarks on the subject of Rules and Regulations in general, and I am done.

In an ideal community no laws or regulations would be necessary as everyone would know what to do and would do it.

Ideal communities do not exist on this earth, however, and a certain number of rules and regulations is necessary. The number of regulations that must be drafted is, however, a close guage of the efficiency or law abiding proclivities of any organized military or social body.

If we see a ship or a squadron whose commander is constantly issuing numerous orders and regulations, the ship, or the squadron, or the commander must be inefficient. They may be required for a short time when breaking in a new organization but no permanent flow of new regulations is necessary or desirable.

The tendency to draft regulations to cover all conceivable cases is illustrated in the old story of an executive officer who was thus afflicted. One day a sailor man used the tray latch catch of No. 1-6 gun as a sinker for his fishing line. Promptly there appeared in the officer-of-the-deck's order book an order announcing that—"hereafter, the tray latch catch of No. 1-6 gun should never be used as a sinker for a fishing line." When you multiply the number of objects on board a ship by the number of illegitimate uses to which they can be placed, you can imagine the field that was open to this executive officer.

The great danger of a mass of regulations is that owing to our limited mental capacities, a certain number of such regulations are bound to be overlooked or forgotten. The average intellect will argue that if one regulation can be broken without punishment, why not all. In other words, obsolete or unnecessary regulations greatly weaken the standing and authority of the necessary ones. So to be effective, regulations should be concise, should not attempt to cover every detail, and should not be changed except for very adequate reasons. Permanency is a valuable asset to us in many respects, provided it does not degenerate into a stagnating conservatism.

If we had in the navy a volume on "Customs of the Naval Service" similar to the one for the Army, which could be taught

to midshipmen and recruits, it would do much to assist in indoctrinating officers with the unwritten and written laws of the service.

When rules and regulations become a part of our mental atmosphere so that they are followed automatically or subconciously, then much of the friction of administration disappears. Many of the signals and letters that now fill the yard arms and typewriters become unnecessary, and there is more time, mental and physical, for the larger problems that confront us. This requires constant study. Let us make it a practice to read over the Regulations every so often. Not all of the book of course, but those chapters that especially concern us. It will make our task easier and also that of our superior officers.

What has been said applies also to the fleet and the destroyer regulations. They were written for a purpose, and some good reason lies behind the existence of every article.

A good way to read them is to assume that you have been detailed to revise them and debate in your mind whether each paragraph can be improved, whether it is obsolete, or whether it is a repetition of a regulation contained in another publication. Can you improve the wording to make it clearer or less verbose? Suggestions for improvement will thus arise which should be sent to the flagship for consideration when the force regulations are revised. Never hesitate to criticise when such criticism is constructive. Through the combined brain work of the youth and energy of the navy as represented by the officers in our destroyer force we can achieve great and lasting results.

[COPYRIGHTED]

U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

AMERICAN AND BRITISH DESTROYERS

By Lieut. T. E. Chandler, U. S. Navy

Since such a wide variety of types of light craft were used so extensively during the World War, it will be well for us, in preparing for the future, to give very careful attention to the design of our smaller vessels, particularly destroyers. Torpedo boats, destroyers, and flotilla leaders were employed by the British in many varied activities; against capital ships in both day and night attacks, as scouts and patrols, as fast mine-layers, for convoying, and for all forms of anti-submarine work. In the case of our destroyers, however, no such wide application was found, for they were employed exclusively in anti-submarine work either as patrols or escort vessels. No American destroyer had an opportunity to fire either guns or torpedoes at any other target than a rapidly disappearing submarine and even these opportunities were most infrequent. The highly specialized service rendered by our destroyers must not be allowed to blind us to the true function of the type in a more general naval campaign. It is accordingly advisable for us to observe what types of destroyers are being built by other navies. We should be especially interested in the types developed by the British as they had the greatest experience in the use of destroyers and are the originators of the flotilla leader. A comparison of the newest British destroyers with our own discloses some very interesting points of difference and shows certain features that we may do well to imitate.

The first feature to consider in any vessel is her seaworthiness. In this respect it may be said of all our newest destroyers, for their hull design is identical, that their seagoing qualities are, under most conditions, quite good. The roll, though deep, is

slow, which is beneficial for gunnery. However, for bucking even a moderate head sea at speeds of twenty knots or above, they cannot be said to be very satisfactory.

British destroyers of all sizes are also practically of one type as regards hull form but this form is radically different from that of our boats. The outstanding feature is the wide flaring bow, called a "Trawler Bow" by Jane. They also have rounded sterns and are more heavily built throughout than our boats. The design is said to have been adopted at the insistence of the commander-in-chief of the grand fleet for a destroyer that could make twenty-five knots in any weather in which a battleship could steam full power and still use her guns. The type was standardized only after considerable experiment and after several unsatisfactory types had been tried and rejected. Under these circumstances there seems every reason to believe that all British destroyers are highly satisfactory as regards their seagoing qualities.

Seaworthiness is a quality in which it is difficult to make a definite comparison. Furthermore, the writer knows of no one having seagoing experience in both types who could be considered an authority as to their relative merits. Although one can judge only by appearances, the British boats undoubtedly appear to be much the more seaworthy. Certainly in a head sea, at least, they would fare far better than our own.

The next feature to be considered is speed. Our destroyers all have a contract speed of thirty-five knots. Some of the earlier boats cannot make their contract speed but most of the new ones make it with ease and some boats have even made runs as high as thirty-eight knots for short periods. The latest British flotilla leaders, a type not possessed by the United States, but one which merits our careful consideration, have a speed of thirty-six and a half knots, while the destroyers have speeds ranging from thirty-two to thirty-four knots. From Jane we may draw the general conclusion that on the whole the speed of our destroyers is superior to that of the British, but by only a small margin.

It is in the question of the armament that the most radical differences may be found. All American destroyers are practically of one type as regards armament, there being a few minor differences in arrangement but nothing really vital. There are

four 4″ guns located as follows: one on the forecastle, well forward of the bridge; one on each side of the galley deck house, located near the deck edge; and one aft, either on top of the after deck house or on the fan tail. The guns forward and aft are on the centerline but those on the galley deck house are only available on one broadside. The galley guns possess three advantages, namely: they have a good platform for the loading crew on most bearings, they are dry for use in nearly all weather, and they have the questionable advantage of extreme depression which might be of use in firing at a submarine close aboard. The disadvantages of this arrangement are that they cannot be fired forward of ten degrees on the bow because of the proximity of the bridge and that at least one gun is restricted in its fire aft by a nearby boat. Also the guns in the extreme forward and aft positions would be very difficult to serve. We see then that this arrangement gives no bow and stern fire and that a single gun mounted on the centerline at this point would possess almost as great an arc of train as the two at present installed. A few of our latest boats have 5″ guns in place of the 4″ but the arrangement is the same.

Anti-aircraft guns in the past have been of two different types and have been located in various places. It is understood, however, that it is intended that all boats will ultimately have one 3″ twenty-three caliber gun located on the fan tail.

All our destroyers carry twelve torpedoes which are mounted in four triple tubes, two on each side.

The British have twenty-two flotilla leaders of slightly varying types, of which the Douglas class represent the very acme of superdestroyer construction, with five 4.7″ guns, one 3″ long caliber sky gun, and six torpedoes in two triple tubes, all on the centerline. The first class of destroyers consists of two "Thornycroft Improved W" and fourteen "Admiralty Modified W" classes. These ships have four 4.7″ guns on the centerline, two anti-aircraft one-pounders, called pom-poms, and six torpedoes in two centerline triple tubes. The next is the "S" class of sixty-one boats, five "Thornycroft," six "Yarrow," and fifty "Admiralty." These boats all have three 4″ high angle (30° elevation) guns on the centerline and four torpedoes in double centerline tubes. The last considered in this article consists

of nineteen "Admiralty W," two "Thornycroft W," and twenty "Admiralty V" boats. These have four 4″ guns and a long caliber 3″ sky gun on the centerline and six torpedoes in two triple centerline tubes.

The characteristics of the different types considered indicate plainly that in torpedo power our ships are unquestionably superior and it is believed that our doubling the number of tubes instead of having half as many on the centerline is correct. Tubes mounted outboard have a greater arc of train than centerline tubes due to the fact that the falling torpedo must clear the deck edge on leaving the tube and that the impulse charge does not carry it far. This practically restricts the fire of centerline tubes to beam shots. One British officer admitted that their centerline triple tubes could not be fired more than ten degrees forward or abaft the beam. Moreover, should it be desired to fire all twelve torpedoes in one attack it is believed that in most cases there would be an opportunity to turn and deliver the other broadside. Thus our non-centerline arrangement of tubes is considered to be fully justified.

It is equally plain that the British destroyers have a very material superiority in gun power and that our deficiency in this respect is not due to the fewer guns carried but the failure to adopt a centerline arrangement. Only one class of British boats, the "S" type, of which no more are being built, have only three 4″ guns on a broadside as is the case in our boats. The next class have four 4″ on a broadside and that gives a 4 to 3 superiority over our boats. The newest class have four 4.7″ guns on the centerline, and thus the 4 to 3 superiority ratio is obviously much increased. When we come to the flotilla leaders with five 4.7″ guns on the centerline as opposed to three 4″ on a broadside any comparison is futile. The fact that two of our boats, the *Hovey* and the *Long*, have 4″ double guns and that a few of the newest boats have 5″ fifty-one caliber guns in place of 4″ does not controvert the general statement of British superiority. Even with 5″ guns a broadside of three 5″ guns is inferior to four 4.7″ and certainly much inferior to the flotilla leaders with five 4.7″ guns. Also the installation of the heavier guns does not correct the error in principle caused by the failure to mount all guns on the centerline; the boats remain correspond-

ingly weak in gun power relative to what they could have been with the guns properly located. Another factor which increases the British preponderance of gun power is the fact that their 3" anti-aircraft gun is mounted on the centerline, is at least a forty caliber, and could be used as a very effective part of the main battery. Our 3" anti-aircraft gun is but twenty-three caliber and would be of little use except at very short ranges, though it is no doubt excellent in other respects.

A summation of the above material shows that the British destroyers are probably more seaworthy. Our boats should be more heavily built forward, especially at the bridge and chart house, and the "Trawler Bow" should be adopted.

In speed the American destroyers are superior and no changes in engineering installations seem appropriate.

Likewise our boats greatly excel in torpedo power and the present arrangement of tubes is satisfactory and should be retained. The question of obtaining the greatest gun power for a given weight of battery, however, merits careful consideration. The British destroyers can deliver a far heavier broadside than ours due solely to the centerline arrangement. The lessons of the war have brought out even more strongly the already well-known fact that gun power is a vital factor in destroyer design. There were many more gun engagements between destroyers and various other light craft than there were opportunities for firing torpedoes. In the day attacks at Jutland it was shown that destroyers have little hope of reaching a position where a successful torpedo attack can be launched against capital ships, unless the destroyers have suffiicent gun power to beat off the enemy boats that are sure to be sent out as a counter measure. The British destroyers' preponderance in gun power was an important factor in the many engagements between scout forces and always gave them a great advantage.

The object of this article is not to show that the British destroyers as a whole are superior to ours but to call attention to certain features in design. The fact that our destroyers are inferior in gun power to the British is not so serious as our persistence in adhering to an incorrect type. The unfortunate part of the whole question is that, whereas the British have adopted an excellent arrangement for their battery and are

building boats of that type only we have chosen a less efficient arrangement, have standardized it, and seem inclined to continue to build boats of that kind indefinitely. The location of the waist guns off the centerline, and the standardizing of that type of destroyer so that approximately 300 have been built seems to have been a serious error. Why this occasion was taken to depart from the centerline arrangement of guns, one that was at last arrived at after all navies had spent millions in the construction of relatively inferior ships, is hard to understand.

The proper measures to be taken in the attempt to redeem this error in the location of the battery are briefly as follows: first, the present design should be abandoned at once and any ship not already completed should have her battery relocated. Secondly, a rational centerline arrangement of guns should be adopted for all new construction and unless something better is devised, the British design should be copied. Thirdly, if practicable we should combine our stacks as the British do and have only two instead of four. If this is not desirable we should at least combine them to have only three as in the "Conner-Stockton" type. We could readily build destroyers with two guns forward of the bridge, by using the British super-posed arrangement, one on the galley deck house, a 3″ long calber sky gun on a platform abaft the after stack (artificial ventilation being installed for the engine rooms if necessary), one on the after deck house, and one on the fan tail. This would give us five guns on a broadside, all 5″ if practicable. The best of the boats already built should be altered as opportunity offered and funds became available. These ships could readily be redesigned to have a broadside of four guns by removing the galley deck house guns and mounting one gun amidships at that point, putting the sky gun on a platform just abaft the galley, and locating an extra gun, on the fan tail or the after deck house. Although it is noted it may be difficult to design the sky gun platform so that the supports will not interfere with torpedo tubes, by careful spacing, and, if necessary, by the use of forced ventilation in the engine rooms, it will be possible to install it.

Emphatically we should not build any more destroyers of the present type. Homogeneity is a valuable quality for the units of a force, but we must not sacrifice all progressive ideas to attain

this end. With the modifications suggested in the hull and gun arrangement, our future destroyers can be placed in the same class with our other new construction in being the best and most advanced in the world.

[COPYRIGHTED]

U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

CO-ORDINATION IN ARMY AND NAVY TRAINING

By Colonel Dion Williams, U. S. M. C.

"United we stand; divided we fall."

In the writings of every authority upon military and naval campaigns and operations, past, present, and prospective, there will be found mention of the importance of intelligent co-operation between the Army and the Navy of any nation at war if the best and quickest results are to be obtained.

If Napoleon at the height of his power could have succeeded in his attempts to build and equip a navy even approaching in efficiency his land forces he would have conquered England, the power that was his ultimate undoing; but the lack of proper training for the French Navy of that period and the utter lack of co-operation between the land and sea forces enabled England to retain control of the sea and prevented Napoleon from invading England, although he got the "three days' east wind" that he longed for when his great army was concentrated at Boulogne for the invasion of the one nation he had failed to subdue.

For many years there was a prevalent idea that the functions of armies and navies were so different and their training so divergent as to preclude their combined operation as one force. A lack of mutual understanding of the functions, powers, and limitations of the two services and a lack of acquaintance one with the other had much to do with this. The services were not trained in peace to co-operate in war, and when the need for such co-operation came, failure too often resulted.

To come to a proper basis for combined training of the Army and the Navy which would go far toward preventing a repetition of the mistakes of the past it is necessary to acquire an under-

standing of the necessity for and value of co-operation between every portion of the nation's military resources. As Rear Admiral H. S. Knapp so aptly states the case in his lecture on "The Co-operation of the Army and the Navy":

> The Army and the Navy have the same ultimate function—to serve as the offensive and defensive arms of the Government. In one sense they are separate and distinct, but in a broader and better sense they are parts of one whole just as the arms and legs are members of one body. It will be an ideal condition when the Army and Navy act instinctively together to accomplish the same purpose, as the legs and arms instinctively obey the will. The fact is that the Army and Navy are largly interdependent and both are necessary to the government of a maritime power, each in its own sphere. When working separately that sphere is outlined with such definiteness that neither need concern itself in the doings of the other with any feelinges of responsibility; but when they are co-operating neither can escape the responsibility for its own share toward the result.

Lieutenant General Von Janson,in his *Strategical and Tactical Co-operation of the Army and Navy,* says:

> It is certainly desirable that the organs of the Army and Navy called upon to confer with each other should from the outset stand on the same ground and that they should be able to understand each other in general matters without special tactical explanation, so that it may not be necessary to define the meaning of the most common ideas and terms; that is to say, the two branches should not confront one another as though coming from different worlds, each having views and a language unintelligible to the other. . . . The assignment of some army officers to the navy, and vice versa, is a means of fitting them for joint preparation for war and in war for joint command.

In all wars requiring operations overseas both the Army and the Navy will be called upon to do their share. As stated by Sir Cyprian Bridge in his *Art of Naval Warfare:*

> Unless one of the two antagonists is specially circumstanced, or both are, naval campaigns by themselves are not likely to end a war or cause the complete surrender of one side. A purely naval contest may wear out one belligerent; but the process will be long, and if one side is quite worn out, the other will almost certainly have begun to feel the effects of fatigue. Consequently, as a rule naval strategy should aim at enabling a land army to give the finishing stroke.

As a basis for mutual understanding between the Army and the Navy in training for co-operation in war the statement of

the case by Colonel C. E. Callwell in his *Military Operations and Maritime Preponderance,* may be assumed:

> War on land and war on the sea have this in common, while military tactics and naval tactics are constantly going through a process of evolution as the science of producing arms of destruction progresses, the broad principles of strategy ashore and afloat remain unchanged from century to century.

It remains, then, for the two services to so co-ordinate their training that the tactics of the two may be mutually so well understood as to give promise of smoothness and efficiency when the time for co-operation comes.

In his book, *The Crisis of the War,* Admiral Viscount Jellicoe says in support of joint training:

> In the matter of organization we must be certain that adequate means are taken to insure that the different arms which may co-operate in war are trained together under peace conditions.

In the service publication, *Joint Army and Navy Action for Coast Defense,* it is laid down as a guiding principle for co-operation that if the main problem to be solved in any operation is an army problem the Navy must co-operate with the Army, whereas if the main problem is a naval one the Army must co-operate with the Navy; but this does not settle the important question of command.

On this subject Colonel Furse in that thorough treatise, *Military Expeditions Beyond Seas,* says:

> In all cases of military expeditions beyond seas there are three distinct phases, viz: the voyage, the disembarkation, and the subsequent operations. The direction of the movements of a large number of ships and of the squadron detailed to convoy them, requires the technical knowledge and experience of the admiral commanding. The second phase is a combined effort of the army and the navy, in which the general and the admiral are equally concerned; and, though in the third the former acquires the supreme direction of the operations, still he is very often dependent on the co-operation and assistance of his naval comrade.

The above are a few brief extracts from the wealth of authoritative opinion as to the great necessity of effective co-operation in combined Army and Navy operations, but the historical examples of the co-ordination in training which would make such effective co-operation possible are more difficult to find.

In the *Influence of Seapower upon History* Admiral Mahan first brought to the attention of the public at large the necessity of adequate naval power for the defense of a nation so situated as the United States, but he also laid stress upon the fact that such naval supremacy is not all and that there must be military power available to back up the naval power and make it effective; in other words, co-operation of Army and Navy is vital to success in great contests at arms between nations.

After the appearance of Mahan's great book the term "command of the sea" came into popular usage, but we find it loosely applied to various conditions. On the one hand it is taken to mean absolute control of the sea, the enemy ships swept from the sea beyond hope of recovery, a condition which would make the transport of an army overseas an easy task. A more limited meaning has been applied to the term to cover a condition of temporary control of an ocean or a large portion thereof by reason of the absence of the enemy fleet in distant waters or his temporary withdrawal after partial defeat for needed refit and repair.

It is hardly reasonable in a war between two fairly evenly matched naval powers to hope for the first condition, and the second condition scarcely justifies the embarkation of a large army for a long overseas voyage. If, however, one power gains such mastery on the sea by the defeat or containing of the enemy sea forces as to make reasonably certain the safety of a large transport of land forces overseas, that power may be said to have command of the sea. The term and its proper usage has a direct bearing upon all combined operations overseas of land and sea forces.

A brief review of the more or less recent historical events in which joint army and navy operations have figured, and of our past efforts at joint maneuvers for training, may serve as a background upon which to lay a picture of future requirements in various theaters where the Army and the Navy may be called upon to engage in combined action. In the lines of such a picture we may be able to trace the solution of the problem as to what processes should be followed in co-operative training in order to secure the best results.

The Philippine Islands

When the destruction of the U. S. S. *Maine* in the harbor of Havana early in 1898 made war with Spain inevitable, after the long series of provocative disorders in the nearby island of Cuba, a squadron of United States naval vessels was on duty in Asiatic waters, where Spain had the important possessions of the Philippine Islands and the Caroline Islands in the Western Pacific. The commander of that squadron, Commodore George Dewey, was a very efficient, active, and aggressive naval officer and when given orders to act against the Spanish naval forces in the nearby waters, he proceeded with no delay whatever.

On April 26, 1898, at Hongkong, Commodore Dewey received the cable announcing the declaration of war by the United States against Spain and the following day sailed with his squadron for Manila, where according to his latest information the Spanish squadron was stationed. Running past the fortifications at the entrance to Manila Bay during the night of April 30-May 1, dawn of May 1 showed the United States squadron off the city of Manila with the Spanish squadron in line off their naval arsenal at Cavite a few miles distant. Commodore Dewey at once steamed to the attack and a few hours later the Spanish squadron was destroyed or captured and Manila and the Spanish naval base at Cavite lay at the mercy of the guns of his ships.

The Spanish commander at Manila was ready to surrender on demand and if Admiral Dewey could have had operating with his squadron a force of land troops sufficient to occupy Manila, he would undoubtedly have demanded the surrender of Manila and occupied it at once. Foresight in planning for a contingency that should have been self-evident during the period of strained relations preceding the actual declaration of war would have made such a force available; but lacking such co-ordination in plans and training, there was no such supporting land force available to take advantage of the naval victory of Manila Bay, either already embarked in transports or mobilized on the west coast of the Uniter States ready to embark.

This is a striking example of the lack of proper co-ordination in planning and training between the Army and the Navy, and as such is worthy of careful consideration. Admiral Dewey, in the presence of the writer some years later, said that had he had

under his command with the squadron a force of two thousand Marines he would have forced the surrender of the Spanish land forces and occupied the city of Manila, and that it was his opinion that such action, had circumstances made it possible, would have cleared the way for the subsequent occupation of the adjacent country and the whole Philippine archipelago by the army expeditionary force which came later, and would have probably prevented the native insurrection which later occured and which cost the United States so much in lives and money and time.

But such a landing force was not available to Admiral Dewey and he had perforce to wait a considerable time until the Army could be mobilized on the Pacific Coast and transported across the Pacific to invest and capture Manila and proceed to the occupation of adjacent territory. In the meantime the native malcontents had been given time to organize their forces and scatter their propaganda of revolt throughout the islands unmolested by any land force of American troops. The hopes of these active insurrectionists for immediate control of Manila and the Philippines was allowed to mount high due to these conditions, and when the belated arrival of the Army of Occupation prevented the realization of their little dream of power it took three years of hard campaigning to convince them of their mistake. All of this could have been avoided by properly co-ordinated plans and training in the United States prior to the war, or at least when it became evident that war was imminent.

Even after the arrival of the army expeditionary forces there was no prearranged co-ordination of the plans of the two services for necessary co-operation in land and sea operations. This resulted in delaying action while such plans could be decided and in many needless misunderstandings between naval and military commanders, all of which could have been avoided by previous combined training which would have indoctrinated the officers of both services so as to give them an understanding of the powers and limitations of their own service and of the sister service as well.

Prior to the Spanish-American War neither the Army nor the Navy had an organized plan-making agency, and as a consequence both services went into the war without any plans of

action for their individual service and no idea of real co-operation between the two services. The Army had no General Staff and the Navy had nothing approaching such an organization. "Any plan is better than no plan," but at this time there was no plan.

In the Atlantic, nearer to the seat of the home government at Washington, it was no better. The hurriedly devised plans of the Army contemplated the investment and capture Havana, the most important city and port in Cuba and the seat of the Spanish government in the island, which was correct as a general decision, but however good the plans we may propose an unexpected move of the enemy may at any time dispose of our well-laid plans. In a vain effort to save Cuba until hoped for aid might come in the shape of a European ally, Spain sent Admiral Cervera with all available ships to the West Indies. After the long Atlantic voyage it was necessary for Admiral Cervera to make a friendly port to refuel his ships for further operations, and of the available ports in Porto Rico and Cuba he chose the one fartherest removed from the American fleet base at Key West, the harbor of Santiago de Cuba with its narrow entrance and protecting hills. Admiral Sampson arrived just too late to intercept the Spanish fleet before it gained the protection of the port and at once established a close blockade.

The narrow entrance to Santiago de Cuba was mined and commanded by the guns of the Spanish ships anchored within the harbor and mounted in shore batteries. It was impracticable to attempt a forced entrance with the American ships and a land force was requested by Admiral Sampson to assist him in taking the entrance to the harbor. In the campaign that followed the arrival of this land force there was a notable lack of co-ordination of plans and co-operation in action which was measured in delays in time, unnecessary losses on the part of the shore forces, and an undue prolongation of the war. The Navy opinion appeared to be that the Army was slow in its advance on shore toward what they considered the proper objective, the heights that commanded the entrance to the harbor, and that in making the city of Santiago the objective of the campaign the Army was failing to serve the Navy's urgent needs; the Army apparently took the view that the Navy should force the harbor entrance and destroy the Spanish fleet regardless of mines and an enforced

presentation end-on of the ships one by one to the concentrated fire of the Spanish ships and shore batteries; and both of these opinions are traceable to the lack of that indoctrination which would have given each service the proper knowledge of the powers and limitations of the other service and have furnished a correct basis for efficient co-operation to the attainment of a common goal.

The centralization of power and control at Washington was another direct result of the lack of predetermined plans for the co-ordination of efforts in the field; strategy boards and war councils sitting in Washington attempted to control the movements of the ships of the Navy and the tactical dispositions of the shore forces landed in Cuba, and such long-range control of movements in the theater of operations was productive of misunderstandings and delays that would have been avoided by a comprehensive, predetermined plan based upon a careful estimate of the situation to be met. Such a plan would have pointed the way clearly to decentralization of control to the extent of giving the naval and military commanders in the zone of operations full control of their forces to carry out the plan.

A study of the errors of the Spanish-American War in both the Pacific and the Atlantic led to a demand in both services for the formation of a General Staff. In the Army the result was the establishment of a Provisional General Staff to be followed later by Congressional enactments providing for the present Army General Staff, and in the Navy the immediate result was the organization of the General Board of the Navy under the able leadership of Admiral Dewey, to be followed a number of years later by the Congressional authority for the establishment of the Office of Naval Operations, charged with many of the duties of an Admiral Staff, or General Staff for the Navy.

The co-operation of the Army General Staff and the Office of Naval Operations through the medium of the Joint Army and Navy Board and its working co-ordinating agent, the Joint Army and Navy Planning Committee, has been made possible by the formation of the two original planning and operating instruments of the Army and the Navy, the General Staff and the Office of Naval Operations, and the two services are for the first time in their history ready for constructive work along

the lines of co-ordination of plans and co-operation in carrying out such plans in peace and war.

This co-ordination has produced a well-defined policy as to plans and a good start has been made in constructive work on such co-ordinate plans, but as yet but little has been done toward co-operation in training the two services with a view to fitting them to carry out such plans. Each service is so fully occupied with training along the lines pertaining to the action of the individual service that there appears to be but little time to give to co-operative training, yet such training is a clearly indicated necessity; however good the plan may be, the plan alone is not enough, there must be actual maneuvers conducted by combined military and naval forces to test the details of the plans of action, to familiarize the services with the objects and aims of the plans, and to accustom the component parts of such combined forces to the nature of the teamwork required.

THE PANAMA CANAL

The project of an inter-oceanic canal to connect the Atlantic and Pacific oceans by means of a trans-isthmian waterway across the narrowest portion of the western hemisphere at Panama was advanced soon after the discovery of the Pacific by Balboa, and the first survey of the isthmus with such an end in view was made as early as 1534. After long discussion of the subject a French company began the actual construction of the Panama Canal in 1882, with the great engineer de Lesseps, who had built the Suez Canal, as its guiding spirit.

The French company failed, due to climatic conditions and lack of any proper sanitation and the resultant losses by disease in the construction personnel, as well as to lack of funds and the misappropriation of the funds provided, and in 1903 the United States government undertook the construction of the canal, purchasing the rights and works of the original French company. The Panama Canal was completed and opened to traffic in August, 1914, and has been in operation since that date.

From a naval standpoint the most important question connected with the canal is as to its use as a means of transferring the fleet or portions thereof from one ocean to the other, especially in war; and from a military standpoint the most im-

portant question is the one of fortifications and mobile defense forces which will deny the canal to the enemy and thus insure its use to our naval forces whenever the necessity arises. The Clayton-Bulwer Treaty between the United States and Great Britain, ratified in 1850, provided that the canal should not be fortified, and at that time it was contemplated that the construction of the canal would be a joint enterprise of Great Britain and the United States. The Hay-Pauncefote Treaty, ratified in 1901, however, contemplated the construction of the canal by American enterprise alone, and, abrogating the first named treaty, granted to the United States the right to take such means as might be necessary for the military protection of the canal.

One of the great arguments advanced by the American advocates of a Panama Canal was that it would afford a ready means of transferring the forces of the Navy from one ocean to the other without the long voyage around South America and thus obviate the necessity for two separate and distinct fleets, one in the Atlantic and one in the Pacific. It was early recognized that to ensure this naval use of the canal in time of war it would be necessary to fortify and garrison the Canal Zone in preparation for eventual hostilities. By some the idea was advanced that this military protection for the canal should be furnished principally by the Navy, but the "Blue Water School" of naval students, who advocated a fleet that would be free to proceed to any waters to meet the enemy fleet and not be tied down to any particular locality as a coast defense force, were able to show the fallacy of the attempt to give the canal the needed military protection by ships permanently stationed at or near the entrances to the canal.

The result was that strong fixed defenses have been provided for the Panama Canal and a considerable permanent mobile force is stationed within the Canal Zone to support and protect the fixed defenses. However, the Navy still remains the "nation's first line of defense," and as such its duty is to prevent, if possible, an enemy fleet or attacking force from a near approach to the canal.

Here, then, is a concrete example of combined action on the part of the Army and the Navy in the defense of a vital element in the military defense of the nation, where co-ordination of

plans and co-operation in action of the two services is absolutely necessary to secure efficient and satisfactory results.

In addition to the forces of the Army allotted to the defense of the Panama Canal there is provided a local naval defense force consisting of submarines, patrol vessels, destroyers, and light cruisers for observation off shore.

The docking, repairing and refuelling facilities of the canal are provided primarily for the use of the merchant ships using the canal, but all of these facilities are also available for the use of the vessels of the Navy in peace or war as may become necessary, and the canal is therefore capable of being used to a considerable extent as a naval base. The close connection at Panama between the activities of the Army and the Navy are such, therefore, as to require especial co-ordination between the services in both plans and training looking to the successful operation in war of this great link in the national defenses.

The Hawaiian Islands

Prior to 1893 the Hawaiian Islands constituted an independent kingdom under a native monarch, a sort of last survival of the ancient conditions under which the scattered islands and archipelagos of the vast Pacific existed as self-sufficient communities with little or no intercourse or dependence upon the rest of the world, but in that year Queen Liliuokalani was deposed by an almost bloodless revolution and the irresponsible native government was superceded by a provisional government led by the foreign element, largely American. A republic was proclaimed in 1894, and the islands were finally annexed to the United States 1898, largely as a result of the necessities strongly accentuated by the campaign of that year in the Philippines. Prior to the acquisition of the islands by the United States, students of naval strategy had realized the great importance of these islands in the control of the Pacific and they were variously referred to by the writers of that period as the "Key to the Pacific" and the "Cross-Roads of the Pacific," depending upon whether the writer viewed the subject from the standpoint of purely naval strategy or from the standpoint of commercial strategy.

Following out the line of thought thus engendered, the naval authorities advocated the establishment there of a first-class naval

base as a position from which the fleet might operate in the Pacific at a distance from the homeland Pacific coast and as a stepping-stone on the route between our west coast and the proposed Panama Canal and the recently acquired territory in the Philippines. The establishment of the naval station at Pearl Harbor followed and since then constant attempts have been made by the Navy to secure appropriations of large amounts of money required to carry out the project of making this position into a first-class operating and repair base for the fleet, so far without avail except for the construction of one large drydock and a few repair shops and facilities.

At first it was advocated to make the defense of Pearl Harbor entirely a naval affair, but it was soon evident that the force required would be much larger than the Navy and Marine Corps could furnish without tying up a large proportion of the available naval force in the defense of one locality, thus running counter to the principle that all naval main forces should be primarily mobile forces. Therefore, the permanent land defenses of the naval base at Pearl Harbor were entrusted, quite properly, to the Army. The forces now employed for this purpose are considerable and should be materially increased if the position is to best serve its full purpose.

However, it should be borne in mind that the reason for the defense of any position in the Hawaiian Islands is entirely a naval one, its value to the United States in war being as a base for the naval forces operating in the Pacific, denying the position to the enemy being only a secondary consideration. Here, then, is a typical case of active co-operation of the Army and the Navy in a definite operation where the joint mission of the two services is clearly indicated and understood. Assuming that the planning activities of the two services have fully covered their part of the work, both as to the action contemplated on the part of the services individually and in co-operation, it remains to so co-ordinate the training of the two services in peace that they may be in readiness to properly carry out their mission in war.

In general, the defense of an island position requires the defense of the island as a whole, meeting the enemy at the points of landing, where his tactical deployment would be most difficult, his forces most liable to be thrown into confusion by the attack

of the defenders, and his efforts at consolidating any position he might gain would be most difficult. There is nothing to indicate that the island of Oahu is an exception to this general principle.

The defense of an island naval base normally presupposes active co-operation of the land defenses, fixed and mobile, and the naval forces afloat allotted to the local naval defense of the position. The two forces have the same mission and no question of command, sphere of influence, or separate plans of action should be allowed to interfere in the slightest with the fulfilment of the main mission.

To capture an island position, assuming that it has been properly fortified, garrisoned, and supplied, requires the transportation of a sufficient landing force overseas under convoy of a naval force large enough to insure protection from the enemy naval force that may attack the expedition en route, a forced landing on the island against determined opposition, the consolidation of the positions gained on the beach, and finally the investment and capture of the positions occupied by the defending forces. During these operations the naval defense forces acting in co-operation with the land defense forces of the island would operate against the transports, the ships of the convoy, and the boats used in effecting an actual landing.

In any war overseas our Army and Navy may have to act in the capacity of defenders of such island positions and also as the attackers of such positions. In the first case co-operation of all of the forces, be they of the Army or the Navy, is a requisite to success. In the second case, the attack of a fortified island position, the remarks of Colonel Furse, quoted above, are particularly applicable and clearly outline the broad principles to be followed as to command and control by the army and navy commanders of the attacking forces. But however good may be the intentions of the two commanders, many questions will naturally arise in the future, as in the past, as to the application of such broad principles to special cases and situations. Actual maneuvers of combined army and navy forces in overseas expeditions for the attack of fortified island positions, simulating the conditions of war insofar as it is humanly possible to do, would serve to bring to light many of the points of irritating contact and the solution of the problems thus presented in maneuvers would

serve as a basis for plans in organization, command, and execution which would go far to smooth the way should it become necessary to carry out such operations in war.

Such combined maneuvers would give the troops engaged in the expeditionary force valuable training in all the elements of the preparation required for such an expedition, the experience of actual transportation overseas under convoy of a naval force in the face of enemy activity at sea, and training in landing against the opposition of an active enemy on a hostile coast without the use of wharves or docks; while the defending side would be afforded an opportunity to test out their theoretical plans for the defense of the position insofar as might be possible short of actual war conditions.

From such maneuvers the Navy would also gain experience in the different phases of the operation, the embarkation of the troops, the stowage of material and supplies, the protection of the convoy at sea against simulated attack by cruisers, destroyers and submarines, the landing of the expeditionary force upon a hostile shore against determined opposition, and the support of the shore operations after a landing has been effected.

The psychologic factor should not be lost sight of in carrying out such maneuvers. It is a fact, frequently brought out in academic studies and war games at the military and naval colleges, that the two services lack intimate knowledge of each other; the Navy is not intimately acquainted with the powers and limitations of the Army and the converse is equally true. The intimate association resulting from several weeks spent in combined maneuvers of this nature would serve to educate and indoctrinate both services in what we may style the art of cooperation, it would give each service an opportunity to see the other service "in action," and it would tend to establish a common ground of understanding which would increase mutual acquaintance and respect and do much to smooth out the rough places that have been stumbling blocks in past campaigns.

The great cost of carrying out such maneuvers on a scale that would simulate actual war conditions with a first-class naval and military power appears as the greatest practical obstacle to the immediate prosecution of the plan above outlined, especially in this era of enforced economy and limitation of armament; but

in reply to this objection it may be stated in time-worn phrase, "one cannot make omelets without breaking eggs."

Coast Defenses and the Navy

The first battleships for the "New Navy," the *Maine* and the *Texas,* whose construction was authorized by Congress in 1886, were designated as "coast defense battleships." This was in accord with the idea of a Navy for the defense of the harbors and coasts of the United States rather than for distant service on the high seas, but such a Navy would practically constitute an adjunct of the Coast Artillery defenses and would be tied to the harbors it was designed to defend.

Opposed to this idea of a purely defensive Navy for the protection and defense of designated localities was the "Blue Water School" of naval officers, who advocated a deep sea-going Navy designed with great cruising radius to search out and give battle to the enemy fleet wherever it might be found on the seven seas. They advocated "command of the sea" as the best aid a Navy could give to the defense of the homeland and insisted that a fighting fleet must be above all else a mobile force. The "Blue Water School" won in this controversy and it is now universally accepted that the Navy shall not be weakened by detachments from the fleet of main elements for the defense of harbors and special localities. The mission of the Navy is now well understood to be, "To gain command of the sea and keep it."

It is still necessary, however, to have certain classes of naval craft assigned to assist in various ways the harbor and coast defenses of the Army. Such forces, known as naval coast defense forces, consist of patrol vessels, naval aircraft, mine layers and sweepers, and coast submarines, and their part in the general scheme of coast defense is clearly laid down in the instructions for joint Army and Navy action in coast defense.

It was at the harbors where fixed defenses manned by the Coast Artillery of the Army existed, and which were frequented by the ships of the Navy, that the Army and the Navy came most in contact in peace times, and as the Navy was called upon to furnish the naval coast defense forces for such harbors it was here that the need for army and navy co-ordination in plans and training appeared to be most imperative.

Questions as to jurisdiction, command, ways and means of defense, and assignment of areas of control in connection with the coast defenses arose and were referred to the Joint Army and Navy Board from time to time after its organization in 1903, and from the consideration of these questions there resulted the establishment of defensive sea areas with rules for the Army and Navy duties pertaining thereto. These rules and regulations showed the lines along which the training of the two services should be conducted in order to secure effective co-operation in the defense of the coasts and harbors, especially of those harbors in which were located navy yards or naval stations or bases. This constitutes the first instance of co-ordination in plans of the Army and Navy in modern times.

The action of fixed defenses is limited to the range of the batteries and as a rule fixed defenses are most vulnerable to attack from the rear or landward side, and for this reason they must be supported by a mobile force to meet attack from the landward side. The purpose of fixed defenses is met if they are sufficient to force the enemy to land at a distance from them and invest them from the landward side, and to accomplish this they must be strong enough to ward off an attack by the enemy fleet. It is the mission of the Navy to meet the enemy fleet, defeat it away from our own coast, if possible, and gain command of the sea which will enable us to despatch an army expeditionary force overseas to invade the enemy territory and give the finishing stroke, as contemplated in the remarks of Sir Cyprian Bridge quoted at the beginning of this paper. But the fleet may be temporarily absent in distant waters, thus giving the enemy an opportunity to land and invest the fixed defenses of an important harbor, as has frequently happened in past campaigns. In such event the co-operation of a mobile force on shore becomes imperative. This is stated here to show the necessity, first, for co-operation between the Navy and the coast defenses; second, between the coast defenses and the mobile Army; and third, between the three forces involved in the operations.

Having these objects in view, at various times maneuvers were carried out by squadrons of the fleet and the coast defense forces to demonstrate the action to be followed in naval attacks on fortified harbors on the one hand and the best means to meet such

an attack on the other hand. In 1900, at the instigation of the Naval War College, the North Atlantic Squadron made an attack upon the shore defenses of Narragansett Bay. Little resulted from these maneuvers but they were a start toward combined training of the Army and the Navy.

In 1902 combined maneuvers were held between the North Atlantic Squadron and the shore defenses of Narragansett Bay and the eastern entrance to Long Island Sound in accordance with a prearranged plan, the details of which are given in *Rules for Army and Navy Maneuvres in New London and Narragansett Artillery Districts, 1902.* The general idea of this maneuver was stated to be, "anticipating the declaration of hostilities, a strong enemy's fleet (without torpedo boats) determines to make a sudden dash upon Newport, or the eastern entrance to Long Island Sound, to secure a naval base, taking advantage of the absence of a declaration of war to find the land forces somewhat unprepared," and it was also stated in the rules that "the controlling idea should be to test the training of the personnel and the efficiency of the matériel."

In 1903 the rules for the maneuvers of 1902 were revised in the light of the experience gained and maneuvers were held on the Maine coast involving an attack by the North Atlantic Fleet upon the defenses of Portland. After this the rules were again revised and in 1905 joint maneuvers of the North Atlantic Fleet and the Coast Defenses at Hampton Roads were carried out, the employment of searchlights, range finders, and smoke screens being specially demonstrated. In 1913, plans were made for extensive joint maneuvers at Panama but were not carried out for lack of funds and other causes.

All of the foregoing joint maneuvers and exercises as well as some others of a lesser character involved the training of the Navy in the attack of fortified shore positions and the Army in the defense of such positions, but did not go into the wider general field of joint action of the Army and Navy. The experience obtained in these joint exercises and resultant studies of the subject have been embodied in rules for joint army and navy action in coast defense, outlining the lines of preparation and action to be followed by the forces of the two services engaged in coast defense at home and abroad and giving the limits

of authority and control for the two services in the common undertaking.

It appears to be well settled that the ships of the first line of the fleet would not be used in an attack upon coast defenses, at least so long as there is an enemy fleet in being which might have to be met in the war, but this general decision does not preclude the use of special ships and second line ships for attacks of shore fortifications if special situations indicate a probable gain from such action commensurate with the risks taken. The use, however, of any class of naval vessel available to support an army landing for the investment of a fortified harbor or position would not be considered an infringement of the general rule, and for this purpose joint maneuvers of capital ships in connection with army landing forces are still desirable.

The naval vessels assigned as a part of the naval coast defense forces belong just as much to the particular harbor or position as do the fixed batteries and their garrisons and as such their training should be carried on at all times in connection with the training activities of the land forces assigned to the harbor defenses. In no other way can both services determine the lines of action to be followed in the joint action that will be imperative to insure satisfactory results under the stress of actual war. Here, as in other situations requiring joint action, indoctrination, mutual trust and respect, and the ability "to speak the same language" is the requirement and these desiderata can be met only by joint training.

THE NAVAL ADVANCED BASE

The mission of the Navy, as stated above, is "To gain the command of the sea by operations against the enemy fleet." To carry out this mission the fleet must first search out the enemy fleet and engage it in battle and to do this the fleet may have to go far afield from its home bases. Ships cannot keep the sea indefinitely, they can only steam so long as their fuel supply lasts and must then seek a refueling station in some conveniently located port; if far from their home bases they must either use their permanent bases near the scene of the operations or take steps to provide temporary or advanced bases in the theater of operations to refuel, revictual, and effect such minor repairs as

are from time to time required to keep ships and crews in condition to fight.

Consideration of these requirements led to the plan for establishing Advanced Bases in the theater of operations whenever such action should be required due to operations of the fleet at a distance from the home bases or from permanent outlying bases. The reasons for such advanced bases, the methods by which the Navy has planned to provide them, and the means for their defense against raids by enemy cruiser forces, have been determined and form a part of naval indoctrination. These naval advanced bases will be established entirely for the use of the fleet in war and in effect they constitute a part of the fleet itself, and for this reason their defense is to be undertaken by a part of the naval forces especially trained and equipped for this duty, namely, the regularly organized Advanced Base Forces of the Marine Corps.

The mission of the Marine Corps, as a part of the active Navy, is "To support the fleet, or any part thereof, in the accomplishment of its mission," and one of the best means by which the Marine Corps can carry out this mission is in the defense of the naval advanced bases required by the fleet. This duty has been assigned to the Marine Corps as an integral part of the Navy on account of the fact that this corps possesses the flexibility of organization required for the duty, the mobility by sea gained by service in the seagoing ships of the Navy, the special training necessary to carry out the task, and as a part of the Navy it can perform the duty without giving rise to questions of unity of command which is an absolute requirement for the successful operations of the fleet.

When the Navy has gained command of the sea by defeating or containing the enemy fleet to such an extent as to justify the despatch of an army expeditionary force overseas, the Marine Corps advanced base forces may be re-embarked for further duty with the fleet at more advanced positions, turning over the occupation of the original bases to the Army, if such occupation will be required as a part of the army lines of communication.

From time to time since the inception of the advanced base idea in 1900 regiments and brigades of Marines have engaged in combined maneuvers with the fleet to fit them for the duty above

required; these exercises embracing the fitting out and embarkation of the advanced base forces in naval transports and the ships of the fleet, the voyage to some suitable locality, the landing there, and the fortification with guns and mines of the selected position. Much valuable experience has been gained by these maneuvers, the results of which should be of value to the Army in its preparation for landing operations overseas, and an elaboration of the methods employed, on a much larger scale suited to probable army conditions in large overseas operations might be worthy of consideration in connection with combined training of the Army and the Navy in preparation for such operations. The cost of fitting out and transporting overseas to some suitable locality of a large army expedition, say one or more complete divisions at war strength, would be large, but when we consider the value to the nation that would accrue from the actual experience of fitting out, transporting and landing such an expedition and in the simulated land operations with the aid of the Navy after a landing had been effected, it would appear that the expenditure would be fully warranted.

The recent experience gained by the Army in transportation across the Atlantic during the World War has given its personnel valuable training in seagoing, but it should be remembered that this movement overseas partook of the nature of passenger transportation on a large scale from well-organized and provided embarkation ports in the United States to almost equally well-fitted ports on the other side. Under other war conditions that will probably arise in future wars it may not be practicable to land an army expedition at the well-equipped docks of a suitably located port in enemy territory. Such ports will probably be denied to us by the enemy, necessitating a forced landing at some port not well provided with docks and landing machinery, or possibly at some point with no facilities at hand where men and stores will have to be landed on a beach in ships' boats against enemy opposition, under the protection of the fire of the ships' batteries. The only way to prepare for such a landing is by actual exercises which will serve to train officers and men in the required details of operation.

The British landing at Gallipoli is one which may be cited to illustrate what may be demanded in a future war, and if its

fatal mistakes can be corrected by proper training maneuvers we may gain the experience which will spell success instead of the defeat which met that expedition. However complete in every detail the plans for such operations may be, plans alone are not sufficient; actual training at maneuvers carefully following out the details of the prearranged plans will serve not only to test the correctness of the details of such plans and to correct discovered defects in the plans, but will also indoctrinate the leaders on sea and land as to their individual and collective tasks and give every officer and enlisted man an illuminating personal experience in the difficulties to be encountered.

The increasing importance of aircraft in such operations, both for the attack and the defense, is the most important new development having a direct bearing on combined landing operations, and the proposed combined maneuvers would give valuable experience to the naval air forces in operating from the aircraft carriers of the fleet and to the land air forces in meeting such forms of attack.

Co-operation in Mobilization and Preliminary Training

In the last war the Army and the Navy both created large cantonments or stations for receiving the recruits and for the preliminary examination, classification, and training of these recruits, the recruits being at first received from voluntary enlistments and later from the local boards operating under the Selective Draft Law. This resulted in considerable duplication of effort which could be avoided in future wars of large magnitude by plans for effective co-operation at this stage of national preparation for war employing the available manpower of the nation.

To anyone acquainted with the systems employed by the Army and the Navy in the first treatment of recruits and in what may be termed their elementary training, a striking similarity appears. In both services the system of segregation was the same, the men were thereafter divided into companies after the same general scheme, and it was only after the training had passed the preliminary steps that any marked differences appeared.

Such duplication of effort and its consequent additions to overhead expenses adds to the money required as well as to the number of instructional units. This being the case, it may be

practicable to give all recruits for both the Army and the Navy, in time of war or great emergency precedent thereto, their preliminary training at the same cantonments, still leaving to each service the specialist training later required. If so, the saving in time, money, and personnel would appear to justify a careful study of the possibilities. Under such a system, to secure a proper distribution of the men to the two services, officers from both the Army and the Navy should be included in the personnel of the cantonments designated for the reception and preliminary training of wartime recruits and assignments to the different services should be made with due regard to aptitude for the service and the personal preferences of the men when practicable.

EXCHANGE OF OFFICERS

In the past the average army officer has had but little acquaintance with the doctrine, training, and life of the Navy or with its limitations and powers of action, and the converse is equally true. Circumstances of service during long periods of peace and even in war have not brought the two services much in contact. The results of this lack of acquaintance between the services have been productive of misunderstandings and disagreements in the campaigns of the past, and history abounds with examples of lack of efficient co-operation traceable to this cause; such as the lack of co-operation between the Army and the Navy on the Mississippi River during the Civil War and the misunderstandings that arose during the Santiago campaign of the Spanish-American War.

As a means of correcting to some extent this fault in the basic education of officers to fit them for command in combined operations in war, it is suggested that a system of temporary exchange in service might be devised which would give at least a few of the officers of each service an opportunity to observe the daily routine of the other service and thus to learn at first hand the powers and limitations of the elements of that service and the methods of its employment toward the common end, victory for the nation in war.

By such a system officers of the Army would be assigned to temporary duty in the active fleet and naval officers would be

assigned to shore duty in the Corps Areas of the Army and with the larger tactical army units. This is already accomplished to some extent in an educational and theoretical way by the assignment of officers of the Navy and Marine Corps to the classes of the Army War College and of army officers to the classes of the Naval War College.

It is a far cry from the "roaring forties" to the "rolling prairies" of Kansas, but as Admiral Luce so aptly remarked in his outline of the first session of the Naval War College, "the military principles underlying war ashore may be applied to war on the sea." This rule, now known as the "Luce idea," was the foundation of much of the constructive work of the Naval War College, and the detail of a limited number of officers of the Navy and Marine Corps to the Army Schools at Fort Leavenworth would be in furtherance of the "Luce idea," and would give these officers a first-hand knowledge of the Army and its methods which would be of great value during combined operations and even in their application to purely naval problems.

The exchange of officers between the two services as above suggested would in time give to each service a considerable number of officers having such a first-hand knowledge of the sister service as would fit them for general staff duties in forces engaged in combined operations of training in peace and the real thing in war.

OCCUPATIONAL SPECIALISTS

The methods of the selective draft employed during the World War brought out the great value of a proper distribution right from the start of the so-called occupational specialists. The classification of the draft local boards showed the occupation, profession or vocation of the draftees, but owing to the shifting of population these records are of little use for the future, and it has been urged that a military census of the available manpower of the nation be taken by districts and kept up to date annually in order that they may be available for assignment to the Army or Navy, where most needed, in time of war or the imminence thereof. Such classifications are now being made to some extent, but both the Army and the Navy are engaged in the work and there must come a consequent duplication of effort with lack of efficiency in the hour of need.

It is assumed that all military students of the subject will agree that a selective draft law should be enacted *before* a war occurs in order that the preliminary lists and classifications may be ready on or before a declaration of war. This would save months in the mobilization, prevent the dislocation of industry incident to a voluntary system of enlistments on a large scale in the early days of a war, and make it possible to send the fleet to sea and put the armies in the field at full force shortly after D-day.

With the present prevalent ideas of our people, however, this seems too much to hope for, but by proper co-ordination of army and navy effort in this direction all available vocational specialists could be listed and classified and tentatively allotted to the service where their services would best serve national rather than purely service ends, having due regard for priority of employment of the services.

It has been proposed that the Army make lists of occupational specialists by Corps Areas and have them ready for assignment to the various arms of the service in such areas. Having only the needs of the Army in view such a plan would meet the requirements, but the Navy in its rapid enlargement from peace to wartime strength on the eve of war will require a large number of these occupational specialists, machinists, engineers, artisans, and electricians for immediate service in the active fleet and its auxiliaries, and as such they can be of immediate use in the Navy with but little strictly military training, whereas for the Army they would require a regular course of military training in addition to their occupational ability already acquired.

In war against a nation having a large active navy our own Navy must be brought to full fighting strength in less time than can be given for the same purpose in the Army and every effort must be made to place the Navy on a war footing before or on D-day. To do this the peacetime personnel must be rapidly augmented by moblizing available reserves, re-enlisting former service men, and enlisting new recruits who may have had little previous training for naval duties. Large numbers of additional specialists in various lines will be required for immediate service and the occupational specialists to supply these requirements should be at once assigned to the Navy, where they can be of

first service to the nation; the question of priority here is a national one, not a service one. Such action would conduce to the best interests of the nation in making the Navy available for service at full strength as the "first line of the nation's defense" in the shortest possible time.

In this, as in practically every feature of the procurement of personnel and material for the national service in time of war or emergency, the zeal of each service and arm of the service to fill its own requirements as soon as possible results in a competition and rivalry that does not work for efficient co-operation, economical administration, or the best and quickest moblization of all services and arms. Under the voluntary system of enlistment this rivalry and competition is good since it stimulates the public interest, increases publicity required to arouse the enthusiasm of the multitude, and tends to bring *esprit de corps* to a high standard. Under the compulsory service system of mobilization these features are not so requisite and a more businesslike method can be followed, namely, the assignment of the individual element to the service and arm of the service where he can perform the best service and where his services are most required.

Co-operation in Procurement of Supplies

There is one subject vitally connected with the prosecution of successful warfare on an unlimited scale which prior to the World War had received but little consideration as regards the effect upon it of efficient co-operation of the Army and the Navy; this is the procurement of all classes of munitions, supplies, and provisions required to fulfill the mission of the nation in war.

In all previous wars the two services had each operated its own agencies for the procurement of supplies, co-operation being almost entirely lacking. This frequently resulted in duplication of effort, increased cost, oversupply in each service of some articles at the expense of a shortage in such articles for the other service, and in general a marked increase in the total expenditure under that indefinite but immense item customarily termed "overhead expense."

Where two grand departments of government operated independently with no deciding power short of the President acting as Commander-in-Chief of the Armed Forces of the nation, it

was frequently impracticable or impossible to refer questions of this nature to the President as they arose in the haste and waste of wartime procurement on a large scale engendered too often by an utter lack of foresight in times of peace. Whether or not the proposed scheme of uniting the War Department and the Navy Department under one government department of National Defense will be a cure-all for the difficulties that have arisen in the past remains to be seen; but it is a fact that very early in course of the preparation for our part in the late world-wide conflict it became evident that the procurement of those classes of supplies which would be required by both services must be made a national and not a service affair. There resulted the establishment of numerous wartime agencies for the general procurement and allotment of such munitions and basic materials according to priority tables worked out under the stress of actual necessity.

It appears to be evident that much time and money and labor could have been saved by a united effort prior to our entry into the war, and in this fact lies the guide for future action. That this guiding principle has not been followed since the close of the war will scarcely be questioned. There are still cases of the two services practically entering in competition into the commercial field to obtain necessary supplies, with the consequent duplication of effort and increase in cost.

To avoid this it is suggested that a plan for co-operation of the Army and the Navy in the procurement of all basic supplies and materials would obviate the difficulties to a great extent and would also afford excellent training in peace for the course of action that would of necessity have to be followed in war upon an unlimited scale. As appropriations become less without a corresponding lessening of actual requirements if we are to keep up a state of preparedness the necessity for economy becomes greater, and the stress laid upon the utmost economy in many recent general orders of all of the services only accentuates the need of the co-ordination of effort here advocated.

CONCLUSIONS

In the past there has been but little co-ordination in plans and co-operation in training involving the joint action of the Army

and the Navy in tasks where both have important parts to play, each within its own sphere. In recent years the machinery for co-ordination of general and special plans has been provided, consisting of the General Staff for the Army and the Office of Naval Operations for the Navy, with the Army and Navy Joint Board as the duly constituted co-ordinating agency where the points of contact may be discussed and the mooted questions decided for the common good.

Assuming that these agencies will succeed in the field allotted to them the further action indicated is combined training in actual maneuvers simulating the problems that would arise in war. Such maneuvers should consist of the three steps in such operations; namely, the embarkation of an army force in transports, the voyage overseas under convoy of the Navy, and the landing on a hostile coast against strong opposition using the facilities carried with the expedition and not depending upon elaborate harbor facilities.

The deficiencies in personnel, material, and individual service training disclosed by such joint maneuvers and exercises should be used as a basis for studies of means to eliminate the deficiencies, the results of such studies being used as guides to the changes required in routine training, design of material, and methods of planning.

Co-operation in peace time in the procurement of basic materials and supplies for the Army and the Navy would result in proper training in this respect to meet the emergencies of war.

Co-operation in plans for the assignment of recruits to the two grand branches of the national defense on a basis of aptitude for the service and for the preliminary training of all recruits obtained from the operation of a selective draft law would result in a saving in time and money, the former being the most important in war and the latter being a continuing factor when the bills have to be paid after the war has been won.

Assignment of a few officers of the Army to duty in the active fleet and of a like number of officers of the naval service to duty with the larger tactical units of the Army would tend toward acquaintance and mutual respect which would come from the

knowledge gained as to the limitations and powers of the sister service.

Assignment annually of a larger number of officers of each service to the classes at the War College of the sister service would also serve to increase the acquaintance and mutual knowledge which will enable the two services to speak the same language, enlarge their mental horizon beyond the confines of their own service, and get a first-hand view of the psychology of the other service.

In order to secure local co-operation in training in those areas where forces of the Army and those of the Navy are engaged in a common mission of defense or offense, local joint committees should be organized to aid the Army and Navy commanders at such stations in co-ordinating the plans and training of their forces in such manner as will, under the conditions locally imposed, lead to a common indoctrination of the forces and produce definite results for good in war.

Centralization in planning is desirable to secure uniformity in indoctrination and a general scheme of procurement for manpower and material, but plans for local combined action can frequently be best worked out right at the scene of future action; this applies especially to permanent positions where the defense is composed of land forces and also of naval defense forces permanently assigned and not a part of the high sea fleet.

In training, however, decentralization is desirable in order to give the commanders in the field or on the sea the opportunity to conduct the training maneuvers of their forces, whether conducted independently by the particular service or in combination with the other service. The results of such training may then be available for use in confirming or revising the centrally devised plans for future training and for actual wartime operations.

[COPYRIGHTED]

U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

A PLEA IN DEFENSE OF PAPER-WORK

By Lieut. C. C. Carmine, U. S. Navy

Opinions upon the relative merits of this or that system of training for the attainment of any given object or state of efficiency must be admitted in our naval service to be of a widely diverging nature. Take for instance the contemplation of a change in the present system of promotion, or the value of speed as compared with armor, the strategy and tactics of Jutland, the naval policy of Britain during the war—all these and many others have ofttimes been subjects for after-dinner discussion in the messroom; that is, when the presence of visitors does not necessitate the courteous dismissal of shop-talk.

Now gather together a group of executive officers, navigating officers, gunnery officers, first lieutenants and engineer officers and see how easy it is for one's point of view to be colored by the particular duties over which he has cognizance. To be more specific, suppose someone at the gathering were to suggest the desirability of doing away with the paper-work connected with target practices; the reports, the computation of scores, the suggestions—what would be the consensus of opinion?

It seems that when Battleship Division Nine first joined up with the British grand fleet, to form a separate fighting unit in the eventuality of a clash with the rehabilitated high seas fleet, informal target practices demonstrated the inferiority of our own vessels in gunnery. This has been a persistent rumor throughout our service which it seems has been neither affirmed nor denied. At least any doubts about the comparative efficiency of those vessels has been dispelled with the knowledge that we were not lax in installing new and needed fire control appliances,

in adopting British contrivances and methods where demonstrably better, and by ultimately rivalling and even surpassing the performances of the crack vessels of His Majesty's royal marine. The outstanding feature of that remarkable improvement in a great many of the minds of our own officers lies in the fact that but little detailed data was taken and no searching analyses made of results. Ships simply went out and fired and were observed if practicable. The British vessels, so it is said, would merely offset their deflection and fire at a neighboring vessel as though it were a target; never bothering about observers, times, checksighting, safety precautions and the like. If this were all true it might indeed be considered no less than marvellous that progress and improvement should simply have resulted from the successive shooting of guns without any data or analyses upon which to base a comparison of dispersions of guns, patterns of batteries, efficiencies of fire-control parties, etc.

It is known, however, that the British did have a modified system for recording observations of target practices in use during and before the war. Their dispersion under service conditions is less than ours and this fact was only established by the aid of definite information obtained during firing. If they did not have an elaborate system such as our own, looking at the same question from another angle, who is to say that the introduction of a great number or all of its features into the British navy during the period of gunnery training before 1914 might not have been very desirable judging by later eventualities? Would a personnel which had been indoctrinated with the necessity for an unqualified observance of safety precautions, an item which is observed rigidly in our own service both as regards omission and commission, have suffered the loss of a *Queen Mary,* an *Invincible,* and *Indefatigable?* Might an analysis of plotting and fire control methods by competent observing parties in reports to the admiralty and the dissemination of this information to the service in years preceding June 1, 1916, have caused the British vessels to straddle on the first or second salvo instead of being smothered by enemy projectiles immediately after opening fire with the consequent loss by gunfire of two capital ships before the battle had half begun?

Let it be remembered that we are not as yet thoroughly conversant with the German methods of preparation for battle, their system of target practices and competitive gunnery training, but we do know that their shooting was quite remarkable in the opening stages of the greatest of modern naval engagements.

For the benefit of those who insist that a possible hit or miss method of recording gunnery progress has produced better results than one having the features of statistical comparison our own Rear Admiral Sims, a great admirer of the British service, has written much which tends to confirm the merit of the latter. He has compared the shooting of the British ships at Coronel, Falkland Islands and Dogger Banks quite unfavorably with the results of our own target practices during the interim. It is safe to state that an analysis of Jutland would further support a bias in favor of our system. From the reports of our own target practices it is known that our fire control is far from perfect but it took an actual encounter with the enemy to demonstrate the same fact to our friendly rivals across the sea.

Each and every vessel that has been in commission any length of time has these reports, some as far back as 1910—data capable of analysis for the detection of errors, but it is known that in many cases little or no attempt is made to make use of them in a comprehending manner. What progress has been made along the lines of record-keeping has been the outgrowth of the efforts of a few who have understood its value and have refused to be swerved from the path by the cries for mercy of the "practical" men. At the present time when the idea of a system of taking and compiling data is gaining a little ground in the service and is being firmly lodged in the minds of the thinking officers, when the office of the Division of Gunnery Exercises and Engineering Performances is beginning to perform work of real value there arises the slogan "Cut out the paper-work!" The feeling is not wide-spread but it lies dormant in the minds of many ready to follow a leadership which coincides with their views. Organized and spurred to action this majority might easily cause the abolition of our present system. It is too bad that they would not investigate the pro and con of the question before becoming dogmatically

prejudiced, but it was ever thus. There are always thousands of sheep to one shepherd, hundreds of eight-hour workers to one eight-minute thinker.

Farragut said "Damn the torpedoes; full speed ahead!" but he must have chuckled when he knew that the state of the tide and the position of his vessels was such that there could never a mine have touched them. Careful thought and planning based upon accurate records brought to him by his reconnoitering party had formed the groundwork for his decision to attack. Does anyone doubt that Dewey knew the state of the defences at Manila Bay and the condition of the Spanish fleet before forcing an entrance? Records! Records! Records!

It has been assumed by a great many well-meaning officers that the only people under Heaven's blue sky who have any interest in all the sheets and sheets that go into the department after a practice are the ordnance highbrows who pore over a layout of cross-section paper or maneuver a slide rule with consummate skill. There has been and is a tendency to believe that the recording of all the data taken at a practice is purely and simply for the accommodation of the swivel-chair people in Washington. The extreme of this view is registered in the "wolf" cry of "bureaucracy." This fact is evidenced so many times in the demeanor of officers and men on an observing party who perhaps are required to arise at five-thirty A. M. in order to record the time of the whistle, or the first salvo, as some would have it "the number of guns in a turret." If those persons ever took the trouble to compile the records and scores and analyze the data with a systematic effort to establish the reason for each shot or salvo missing the target and had to deduce results from a set of statistics which, compared to the famous Labyrinth, are but as a pebble to the Rock of Gibraltar —they might be inclined slightly towards a spirit of tolerance.

In the first place a person with the above-mentioned restricted viewpoint does not thoroughly understand the real value of the office and personnel who compile and disseminate the information on gunnery performances of vessels on active duty. They do not appreciate the importance of the functions of this central statistical office. It is from there that are published the results of practices during previous years so that standards

may be set which will measure the success or failure of a practice of today. That is the *raison d' être,* as the strategists would have it, of this office—to publish comparisons, stimulate progress through the age-old method of competition. If all this is conceded, a fair question might be asked as to how a fair and accurate estimate of a vessel's, division's, or fleet's gunnery performances can be made unless there is some authentic data taken? Authentic data can only be obtained on the ships, at the guns, the instant they fire or the instant the projectiles land.

The importance of records and information is amply illustrated in a consideration of international, business and social relations. It takes years and tens of years, the devotion of the lifetimes of scientists and scholars to the collection of data, to methods of research and analysis, in order that the truth of a proposition may be established. Their laboratories, libraries, and studies are central offices in which statistics are sorted and stored for reference in the struggle for proof of a theory. Witness a few quotations and concrete illustrations.

As Napoleon lay on his deathbed he is reputed to have uttered the following: "Let my son often read and reflect on history. This is only true philosophy. Let him read and meditate on the wars of the greatest captains. This is the only means of rightly learning the science of war." Reports of target practices are condensed gunnery histories and histories are records in their broadest sense.

Here are significant quotations on the subject of records taken from "Remarks on Full Caliber Practice of the Second Battle Squadron Grand Fleet":

"Records annihilate time and space, bring back the past, and give us dependable glimpses into the future."

"Records warn of wrong methods, unwise procedure, and inefficient operations."

"Records check against extremes."

"Records quickly tell the direction and rapidity of progress."

"Records furnish a basis for all future work."

The correct conduct of military and naval strategy and tactics is so frequently a matter of the victor's superior knowledge of the factors necessary to achieve success as learned from a

study of previous similar or related problems. You have heard the claim of Admiral Von Tirpitz. Had the German strategists properly appreciated the principles unearthed by Mahan in his comprehensive treatises of naval history, and had they adhered to an offensive-defensive campaign on the sea in 1914 and under the sea in 1915-16 who can say what may have been the results? The German staffs had learned the real significance of sea-power and had constructed a truly efficient service in keeping with their national aspirations but there were evidently salient features in the application of sea-power which are made very evident in a close scrutiny of Mahan's works, that the Teutons had neglected. This is an example of the possible uses of records on a large scale, being international in its scope.

Science furnishes ample proof of the value of records. The toil and worry of a lifetime were spent in the collection of data for the establishment of Darwin's theory of the origin of species. He had to cross continents and explore unknown regions in the interests of research to convince himself and the world of the truth of his hypotheses. Every avenue of doubt had to be closed by conclusive evidence furnished in the collection of statistics on birds and beasts of the earth, on records illimitable until any doubts were buried under a huge mass of proof.

Business furnishes examples almost too numerous to relate of the importance placed upon records. The modern tendency towards standardization and the division of labor has made it necessary to settle on the true value of a day's work. Time and motion studies have been inducted into factories for the purpose of cutting down time and establishing a standard from which wages may be adjusted for a good or fair day's work. Elaborate bonus schemes have been inaugurated in plants and factories for the stimulation of production and the reduction of unit costs of articles. These extra compensation plans and rulings on what shall constitute a fair day's work are based upon the recording of accurate data on the processes involved and the results achieved over a given period. Having established a standard, records are continually kept with the idea in view of modifying standards, changing the systems, increasing production.

Cost finding in business has demanded a strict accountancy of every minute detail which might enter into the manufacture of

a product from the raw to the finished state. Regular departments have been organized with special employees, men of brains drawing down more than substantial salaries, to record and analyze statistics on costs. The literature published on cost finding nowadays is enormous. The business executive is daily confronted with estimates and masses of figures from his cost finding department compiled to prove where this or that item of cost may be reduced or eliminated and profits increased. Business is absolutely shackled, under the influence of statistics.

Verily, verily it is an age of records. The world has come to recognize the tremendous value of detailed information regarding those incidents of lives, those illustrations of steady growth which have characterized progress from the paleolithic to our present "golden age of materialism."

To return to the immediate perspective, the subject of gunnery and target practice reports. We have stated the purpose of assembling and analyzing these in the department to be that of registering comparisons between different units and the setting of standards; but they render a yet more immediate service directly to the vessel which has completed a practice and which retains a copy of the results on file. This fact it is believed has been somewhat overlooked. The average idea of preparation for a practice in only too many cases is to drill and drill diligently up to the day of the event, if possible observe other vessels fire first and learn their mistakes, correct these over night; then shoot, make up the other ship's scores and forward as soon as possible, receive and correct your own scores and forward hurriedly; then cut another notch on the desk and consign the memory of that practice to the shores of the river Styx. The next year the same procedure and so on. How few ever go back to those reports of previous years, pick out, sort, and compile the glaring mistakes which spelled only partial success in one practice and rotten failure in another?

What is the specific value of the copy of the report of scores which remains aboard a vessel other than to carry out the function of any record? What else but to point out the reasons for each and every salvo missing the target, which is the ultimate aim of records in gunnery anyway? Yet one officer after another will wonder indefinitely for years to come why his ship didn't

shoot in such and such a practice when it is put down in black and white if he would only take the trouble to search it out. At this point let it be stated emphatically that the impression is not meant to be created that the causes of misses will be found correct as assigned by the board of observers who make up the reports. That would indeed be a millenium. One only has to witness a board of observers and score-keepers rushing through the papers of a short range battle or director practice to understand how closely they ofttimes analyze a miss. It is too frequently a case of "cause unknown" when the factors which caused the failure to hit are not perfectly evident. At the same time score compilers have a justifiable grievance, for after a ship has once fired and accurate data at a gun or station has not been taken it is many times impossible to be definitely sure of any reason for a miss.

The reports of scores, after final completion, must be examined and analyzed by the ship which has fired and which is the interested party to definitely and conclusively establish the reasons for misses, whether it be pointing, training, sightsetting, plotting, range-finding, communications or any of the host of other details which spell failure to hit. These errors must be collated and kept on file for future reference and comparison. The continuous shifting of the officer personnel necessitates the keeping of permanent records on board vessels to enable newcomers to perceive the mistakes of predecessors. Records are on hand on every vessel, but are they used? The question is not one of their existence but of their use. Nine times out of ten what is considered to be the one panacea for poor gunnery? Drill! Drill! Drill! It is believed that if one quarter of the time placed upon intensive drill were devoted by the officers, who are the planners and thinkers, to a study of other ship's gunnery performances; to the acquisition of knowledge on the proving methods and the statistics on guns at the proving grounds; to the data on the accuracy and probability of gunfire; and to a thorough, conscientious, painstaking analysis of each and every report of target practice of their particular ships, our naval gunnery would jump by leaps and bounds.

If you would look further for proof of the value of these reports and the feasibility of their use in preparing for target

practice and battle, attention is called to the recent short range director practice of a vessel of the Atlantic fleet, the methods of preparation, and the execution. For years it had been assumed on this vessel that the guns of the main battery had different ballistics; at least different corrections had been used for the separate turrets on previous practices. A careful study of the reports of practices revealed the error of this assumption; in other words the idea of excessive dispersion between guns or between turrets could about ninety per cent of the time be attributed to the functioning of the personnel in the operation of the material. The errors which had been made over a period of eight years were compiled and summarized and there was presented an imposing array of glaring mistakes committed right on board the vessel; not by the ammunition depot, the powder manufactory, the designer of projectiles, or the proving ground experts.

What better way to convince a spotter that it is practically useless to spot shots in range and deflection in short range battle practice and in deflection in short range director practice than by presenting him with figures which prove that during the previous seven or eight years fifty per cent of the spots given on one particular vessel were reversed on immediately succeeding shots or salvos and that an additional twenty-five per cent were not necessary as spots at all?

The best way of convincing a set of pointers of the importance of pointing at the center of the bull's-eye is to summarize the misses over a given period, coupled with a comprehensive explanation of the value of hits in the computation of ship and gun scores.

Plotting—praises be! If ships would only break forth their antiquated records and analyze them for the purpose of learning how rangefinder ranges and ballistic corrections checked on each shot or salvo with sight bar ranges and hitting gun ranges the results would be surprising, if not astonishing. How some ships can fire a poor practice and the plotting room get a clean slate is a mystery—no, not a mystery but rather a humorous paradox. There was once a fleet gunnery officer who appreciated the fact that too little attention was being paid to the repetition of errors in the plotting room; and so he often made it a point

to observe the target practices of the different vessels coming under his cognizance—in the plotting room. The incorrect setting of convergence systems has been a very noticeable cause of misses in director fire during previous practices. A careful computation of the proper convergence for turrets checked with the settings of the system as recorded on former reports and this checked with the observations of the fall of shot on the same reports furnish ample data for the conclusion that these convergence systems are too often improperly handled.

Suppose there is a question whether it is more desirable in director practices, especially those at short range, to fire on the up, or down roll, or both. An examination of the reports with their data on roll and pitch checked against the time of salvos must furnish some information as to the augmenting or retarding of the roll by one method or the other. Such an examination for the ship in question revealed the fact that firing on the up-roll on previous firings had given the vessel a decided kick on each salvo. The up-roll was chosen and the results attained in the next practice bore out this decision quite conclusively.

Probably the most important revelation made in a careful study of these reports of former gunnery exercises was the fact that if the computed ballistics had been used with more confidence and if spotting had been cut down about seventy-five per cent the vessel's hitting power and gunnery score would have increased remarkably. Excessive spotting has had the tendency to alter ballistics for different turrets when they are firing separately with consequent misses on opening salvos of suceeding turrets. In other words the spots necessary to correct the errors of one set, whether pointer or director fire, were carried through as ballistics to be applied to the following set—a practice which it is contended is incorrect. The erratic shooting sometimes resulting from this procedure has led to the assumption that turrets and guns shoot quite differently, that computing a ballistic for all guns of a battery of the same caliber with the idea of its being found correct for all guns is a useless waste of time and energy, and that it's all a matter of luck anyway. It is probably this very point of view that has made short range director fire a matter of luck. A real, painstaking analysis of the reports of previous target practices, fallacious and incomplete

as they sometimes are, would have established, not beyond a reasonable doubt, but would have suggested entirely different conclusions. The records are not faultless because they are not taken with perfect care, by perfect men, with a perfect idea of what they are for; but they are tremendously valuable. They at least form a working basis for the formulation of a policy, a plan. It requires a person with keen judgment and a sense of proportion to weigh the rather incomplete evidence propounded in the pages of target practice reports but there are always to be found certain luminous facts which stand out like the headlines of a yellow journal.

It must be sincerely hoped by those who appreciate the intrinsic value of records and are in accord with the principles upon which our present system of compiling and analyzing them are founded that no influence will be brought to bear to eliminate them. If the paper-work must be moderated, so be it, though it is hard to see how it is possible to obtain valuable data from any curtailment of the present system, with the possible exception of doing away with one or two superfluous sheets here and there.

If one is to concede the correctness of the views expressed in this brief treatise it is rather to be hoped that means will be taken to further instruct parties of observers in being more careful and detailed in obtaining their data. Efforts will be made to explain the importance of the link which individual observers' reports form in the chain—a chain which measures the progress while ever leading towards the real desideratum: maximum volume of effective fire at every instant when within gun range of an enemy.

In conclusion why is there not disseminated from the department or from the fleet, force or division staffs if they are truly interested in an improvement of our naval gunnery, which must at the present time be a cause of reflection in at least one fleet, why do they not publish pamphlets analyzing the faults set forth in practices, comparing results, giving forth praise or criticism where due? Ships would like to know what is considered to be a fair day's shooting under different conditions. A little advertising; a little cost finding; a little salesmanship; a little accounting.

We are not using the records we have on board and in addition the only time we hear what the other vessels are doing is when we observe them or at the end of the year when the scores are pub-

lished—"and there is no health in us." Let's have the news. During the war the division with the grand fleet was a veritable circulating library of information which fact rather discounts the idea that they didn't do any of that sort of thing "on the other side," but what has happened to a system of propaganda that was once so useful in achieving results? Aren't we really trying to design a machine by the light of a Christmas candle when a mere turn of the snap switch close by would present a flood of brilliancy from the Mazda lamp overhead?

DISCUSSION

Psychology and the Naval Officer

(See Page 1909, Whole No. 226)

Lieutenant D. P. Moon, U. S. Navy.—Lieutenant F. H. Gilmer in his article, named above, states that "All mankind, except imbeciles, are capable of being properly designated as belonging to one of three classes." These classes he defines as the "thinker," the "director," and the "doer." He then proposes to divide all naval officers into these three groups and assign them to duty according to the group into which they fall by psychological test.

This plan might be all right if officers were all nicely tagged with the proper classification and were just waiting for a psychologist to come along and decipher the tag so that they and the Navy Department would know just what kind of work they should do the rest of their lives. But they do not come so nicely tagged.

Lieut. Gilmer is giving the multiple type theory when he divides mankind into groups. This doctrine is expounded for the most part by fireside scientists who never go to the trouble to test their fine theories by actual experimental verification. Such theory is disclaimed by practically all psychologists who merit the name.

Views of psychologists in general are summed up by Edward L. Thorndike, Professor of Educational Psychology in Teachers' College, Columbia University, who makes the following objections to the multiple type theory; pp. 379 to 381, volume III of "Educational Psychology":

"In proportion as exact measurements have been applied, evidence expected to favor the multiple type theory has turned out in favor of the single type theory."

A second objection is "the rarity of the inverse correlations between desirable traits upon which so many of the supposed multiple types are based."

Another objection is that "investigators who are strongly in favor of the multiple type theory and accustomed to interpret facts in harmony with it, yet find so few cases of it."

"Lastly," he states, "I may mention the fact that satisfactory proof of the existence of a distribution of human individuals after the fashion demanded by the multiple type theory has never been given in a single instance, and the evidence offered by even the most scientific of the theory's adherents is such as they would certainly themselves consider very weak if they were not already certain that types of some sort there must be. Thus a fair minded perusal of Stern's "Psychologie der Individuellen

Differenzen," designed to be a description of the types into which human nature falls, is almost a sure means of stimulating a shrewd student to the suspicion that intermediate conditions are more frequent than the supposed types, and that there are far more ordinary people than there are of all the 'types' put together."

Lieut. Gilmer laments that "with the exception of a few specialists, (all officers) are doing general duty." The Navy Department in setting such a policy has not done so blindly. Sad disillusionments have occurred in the past when too much specialization has been tried and there are many officers who think that we have too much at present. A wide variation in an officer's duties is imperative to give him the experience and necessary general education for the exercise of command rank.

If the plans of the article were followed, each newly graduated ensign would receive a psychological examination to determine if he was "properly equipped to be qualified as office material" and to "show to which of the classes the officer belonged and the results should be used as a guide in the assignment of that officer to certain specific duties." A midshipman is under constant test of his officer-like qualities during four long years. No psychological test that could be devised could test him as he is tested during this time. Thorndike shows that no classification could be made such as Lieut. Gilmer wishes to make. Even if it could be, any ensign assigned for life in one of the classes as the result of a test would suffer a grave injustice. There would be no certainty that he could not do just as well in one of the other classes with a little training, yet he would be forever barred from finding out, and his general education would be greatly limited.

A tacit assumption made is that officers have no choice in the selection of their duties. This has but little foundation except in the case of junior officers who are often shifted from one duty to another without much reference to their desires, but only as wise steps in their education. As an officer's length of service increases he has increasingly greater choice in the selection of the duty he performs. If an officer does poorly in any particular line of work, it will be naturally distasteful and he will select some work which is more congenial. Psychological experiments have shown that when people are engaged in work which they like, there is a high percentage of cases in which the people can do the particular work each is engaged in most efficiently. The net result is that most officers get the work which they can do best.

Granting for a moment that there are three classes as stated, it is difficult to recognize in the "doer" the qualities that would make an officer. "The doer is the man who when properly directed will exert much energy in the performance of his duties.—The doer is an able subordinate though seldom capable of assuming the duties of high command." This definition would perhaps fit the lower grades of petty officers but has small application to officers.

The application of psychological principles may help solve many problems in the Navy. Personally I have found a psychological test devised by Lieut. (C. C.) R. S. Hitchcock very useful in picking out fire control personnel. There are many other uses to which the principles may be put, and though Lieut. Gilmer's article does good in creating discussion, it misses the mark.

The General Board

(SEE WHOLE NO. 228, PAGE 189.)

REAR ADMIRAL BRADLEY A. FISKE, U. S. N. (Retired).—My much admired friend, Admiral Wainwright, does an unintentional injustice, it seems to me, to suggestors of new schemes. I allude mainly to the sentences:

> Admiral Fiske, writing on the defense of the Philippines, states that he had recommended that reliance for their defense be placed on airplanes. This was made at a time when the efficiency of the plane, even as a scout, was all to be developed in the future. One is reminded of Admiral Sir Percy Scott, the great prophet of the submarines. Both admirals have rendered important services to their respective countries; both have large imaginations and are gifted with a prophetic *flair*, but their advice for present everyday work has not always been the best. Prophecies of the future are not always the best foundation for the present needs. Had this character of advice been followed, our destroyers would have been without torpedoes while the ten thousand yard torpedo was being developed, and the shore of the Philippine Islands littered with the wrecks of imperfect airplanes. To prophesy for the future the head may be in the clouds, but to provide for the present, the feet must be firm on the ground.

This paragraph indicates the estimate of the inventor of new schemes that used to be held, but that is held by only a few at the present day. Most people realize now that it is possible to propose a new scheme and yet keep one's feet on the ground. Most people also have learned from the progress of the last half century that the mere fact that a certain apparatus is unreliable is no reason for refusing to try to develop it and make it reliable.

As a matter of fact, I did not "recommend that reliance for their defense (the Philippines) be placed on airplanes." I simply suggested that a certain scheme be tried, to redeem a situation that was admitted to be hopeless.

At the time (1910-1911) I had been inventing for thirty years, had made a few successes and more failures (as every inventor does), and knew from bitter experience what a wide chasm separates an attractive idea from an actually produced invention. I knew that airplanes, at that time, were wholly undeveloped and wholly unreliable; but I felt absolutely sure that *they could be developed* in instruments of war that could prevent any troops from landing in open boats. Events have proved that I was right. I merely suggested a line to work in. Subsequent events have proved that it was a good line: perhaps the only good line.

Of course, Admiral Wainwright is correct in believing that there is danger in pursuing new schemes and neglecting schemes that have been tried and proved to be good. But every navy officer knows that; even if he invents new schemes. Like every sensible manufacturer, no matter how enterprising he may be in developing new apparatus, *he must be very careful to make experimental work take a place subordinate to regular work.* Like every good sailor, he must not let go of one rope until he has got hold of another.

I am sorry that Admiral Wainwright thinks that the change from the Aid System to the present one was a "step backward." As Aid for Operations, I found when the Great War broke out in Europe, that I was wholly powerless to do anything except routine work: largely for the reason that the office was not legalized, and could be abolished at any moment by the Secretary. The Aid for Operations, and the whole Aid System, could not continue to exist save by his consent.

So I concocted a few paragraphs which Hobson got put into the Appropriation Bill in January, 1915, by the unanimous vote of the House Naval Committee. This provision created the office of Chief of Naval Operations; an office which no Secretary could abolish. Secretary Daniels succeeded in striking out some of the most important clauses; but I got some of them put back the following year, notably the clause directing the detailing of "at least fifteen officers" for making war plans.

The Aid System was an admirable step toward a General staff. But it was a short step, and it constituted a wholly inadequate organization for war or preparation for war. I think it is the consensus of officers who have had experience with both organizations that the office of Chief of Naval Operations is better than the Aid System.

Officers for Shore Duty Only

(SEE PAGE 1885, WHOLE NO. 226)

CAPTAIN E. P. JESSOP, U. S. NAVY.—The comment offered by Captain Snow (CC.) in the February number of the PROCEEDINGS seems to the writer to be based on a very cursory reading of the original paper on the above subject, or else the writer's methods of expressing his thoughts are confusing. Whichever reason is true, it would seem to be necessary to attempt to clarify some points at issue since it is believed that the subject is very vital to naval efficiency and should have a complete airing.

In the first place, I would ask the discussionist to reread the article with the following points in mind:

That the writer believes, and bases his article on his belief, that no specialist can be as efficient in his specialty without practical experience in the operation of the product of his specialty as he will if he has that experience.

That the corps system, both in construction, and engineering in the Navy, acts to prevent that experience being gained by the members of the "officers for shore duty only" class.

That it is perfectly feasible for that class to get the proper proportion of practical experience without in any way reducing their ability in design and construction, but on the contrary greatly enhancing it.

That the members of the Construction Corps and of the "engineers for shore duty only" class, are losing incentives and perquisites by not being available for command and the former are losing something in promotion which must always make for a soreness in their souls for which there is only one remedy and that is putting them all in the regular line and making them as much a part of the operative as of the industrial Navy.

That the ability of the personnel of both the Construction Corps and the incipient Engineers Corps is unquestioned, but that the limitations imposed upon them by the corps system, and particularly in the training of the younger generation under that system, narrow their viewpoint and limit their usefulness to the Navy unnecessarily, and most seriously.

That it is not economical for the Navy to spend large sums of money educating specialists and then to curtail their usefulness to the service as the corps system does.

That the amalgamation of the engineers, while effected primarily to put a stop to friction between corps on board ship, resulted in great improvement in engineering in every way, and it was not until 1916 when the "engineers for shore duty only" law was foisted on the service with its gradual removal to the beach of the older officers who had trained themselves in engineering and liked it, that engineering in the Navy began to run down again.

That the corps system both in the Army and in the Navy has been an obstructive element always, and for our purposes as far as construction and engineering are concerned it is particularly deleterious because of the intimate relation of personnel and material in a ship if she is to be an efficient unit of the fleet.

In other words, the writer thinks that Mr. Squeers was right when he said, "W-i-n-win-d-e-r-der, go wash it," as it takes such intimate connection with a window to find out if the putty is standing up to its work, if the sash fits in its grooves and if the other adjuncts for the operation of the window are right.

The discussionist does put his finger on a weak point in the original article when he points out that no chief of Bureau of Ordnance has served in that capacity for twelve years. The writer had in mind the chief of Ordnance of the Army, and temporarily confused the two, but the essence of the statements made in that connection are true and are known to all who were intimately associated with ordnance at sea immediately after the Spanish War.

His discussion of the relation between length and stream lines seems a bit beside the point.

The idea expressed by the writer was that continuous practical demonstration at sea of the difficulties of making the hulls as designed do what they were designed to do should have acted on any Navy constructor present to cause him to be more interested in cures for the condition than he could have been without such practical demonstration.

In practice, it was almost impossible to drive those ships at their designed speeds for any extended interval due to the fact that to do so called for the maximum overload which could be placed on the machinery, and if they could not be driven at such speeds for extended intervals, then they were not the effective units of the fleet that they were designed to be, and, therefore, the design was wrong. If, as intimated by the discussionist, the design was made on the economical speed factor, letting the battle speed take care of itself, then we simply have another argument for amalgamation.

I believe it to be quite clear to the Navy in general what battleships were of bad design for getting battle speeds with a practical horse-power, but for the information of the writer of the discussion I will state that no ship prior to the first dreadnaught showed proper results in this regard.

This subject cannot be quitted without inviting attention to the fact that the model tank experiments are practical, not theoretical, experiments and they are also operative experiments, and by the statement of the discussionist I take it they have been successful in pointing the way to improvement in the lines of ships, and it does not therefore seem improbable that the writer's idea that further practical experience with the operation of ships would enable the constructors to clear away other weaknesses of our ships if the constructors were given the opportunity for such experience.

The statement that "American destroyers, some years ago, were making their speeds with about two-thirds the power of contemporary British destroyers of equivalent size and speed," seems to be true of our later type of boats, while not so true of the classes of ten and twelve years ago, but even the horse-powers of the late boats which were, evidently, used by the discussionist are the designed horse-powers and it would be very interesting to know the actual performance data on these vessels.

By far the most serious misapprehension which the discussionist labors under is shown when he states apropos of the extra horse-power needed to drive British destroyers: "This, however, does not show that the British constructors were in error in adopting what the author would, undoubtedly, call inefficient stream lines. At that time the British engineers were developing a horse-power on much less weight than we were. Getting their horse-power so cheaply, as regards weight, it was justifiable to adopt decidedly shorter boats, with the attendant advantages, and to accept for top speed the high resistance necessarily incident to reduced length."

The value of a destroyer in war time rests so much on her fuel consumption, a great part of which must be expended at high speeds, that it is past all comprehension how any sane individual could seriously make the statement quoted above.

One-third less horse-power means one-third less fuel burned and one-third more radius of action with equal bunkers, and yet according to our critic, "this does not show that the British constructors were in error in adopting the shorter boat." The above but demonstrates the false viewpoint of a practical problem incident to separation from practice caused by the corps system.

One almost wonders if the discussionist ever saw one of our earlier battleships underway at sea when one reads his statement. "The mere fact that at maximum speed and over a range of only a knot or so, a battleship makes a strong bow wave does not necessarily justify the conclusion that the specialist did not know what he was doing and would have prepared a different design if he had had a three-years' cruise on another ship."

The "strong bow wave" extended over many more knots than indicated above.

The writer can assure the discussionist that the material from which he wrote the original article is authentic and is well known to the greater part of the Naval service, and specific incidents are not used simply because it was the desire of the writer to omit personalities entirely and to deal with systems and results.

The present condition in engineering while greatly superior to that existing at the close of the Spanish War is believed by the writer to be below what it would have been if it were not for the evils of the "engineers for shore duty only" law, and it was to attempt to correct while there is yet time, a serious lowering of our engineering standards, that the article in question was written.

To conclude, attention is invited to the discussionist's statement that: "Amalgamation of the Construction Corps with the Line will violate a fundamental principle of organization as it means the complete coalescence of two corps whose lines of training, thought and life-work are radically different, although they strive toward a common end—the defense of the nation."

Methinks the violation of the fundamental of organization consists in permitting two corps, having such a vital effect on the efficiency of a unit of the fleet to be so radically differently trained, as to cause them to have a widely different viewpoint and thought, and it was to correct what the writer considered a violation of fundamentals that amalgamation was proposed.

As for criticism; those at sea will always criticise those on shore and to make this criticism effective it is necessary that both sides know the other fellows' work and viewpoint.

U. S. NAVAL INSTITUTE

SECRETARY'S NOTES

Membership Life, regular and associate, 4,819.

New members, 15. Resignations, 48. Deaths, 4:

Commander Guy Whitlock, U. S. N.

Lieutenant Commander A. H. Dutton, U. S. N. R. F.

Lieutenant E. O. Fitch, (CC) U. S. N.

C. Nygaard, Ch. Bosn.

Practically the whole service receives the benefit of the PROCEEDINGS, yet many officers who read it monthly are not members, and therefore contribute nothing to the support of the Institute.

Members are requested to urge non-members to join. Publication costs are now so high that the Institute is carrying a loss. The cost, per member, however, decreases with an increase in membership.

Dues The annual dues ($3.00) for the year 1922 are now payable.

Regular and associate members of the U. S. Naval Institute are subject to the payment of the annual dues until the date of the receipt of their resignation.

Discussions Discussion of articles published in the PROCEEDINGS is cordially invited. Discussions accepted for publication are paid at one-half the rate for original articles, or about $2.25 a page.

Address of Members To insure the delivery of the PROCEEDINGS and other communications from the U. S. Naval Institute, it is essential that members and subscribers notify the secretary and treasurer of every change of address, without delay.

Book Department

The Institute Book Department will supply any obtainable book, of any kind, at retail price, postage prepaid. The trouble saved the purchaser through having one source of supply for all books should be considered. The cost will not be greater and sometimes less than when obtained from dealers.

The Boat Book, 1920, and *The Landing Force and Small Arms Instructions,* 1920, are now ready for issue. The price of the former is $.50 and the latter $1.00 per copy.

Index to Proceedings

The attention of readers of the PROCEEDINGS is invited to the classified analytical index for numbers 101 to 200 inclusive, which is noticed under "Publications." This is a most complete index, which has been prepared at considerable expense in order to make readily available the information contained in both the articles and the notes of these issues. Only a limited number of copies have been printed. Price, bound in cloth, $2.35; bound in paper, $1.85.

Articles

The Institute desires articles of interest to all branches of the service, including the reserve force. Attention is invited to the fact that the submission of articles is not limited to members, and that authors receive due compensation for articles accepted for publication.

All articles and discussions submitted by persons belonging to the navy for publication in the PROCEEDINGS must be in duplicate, one copy being signed by the author, which will be submitted to the Navy Department when the original is published, as required by General Order No. 46, of May 20, 1921.

Reprints of Articles

The attention of authors of articles is called to the fact that the cost to them of reprints other than the usual number furnished, can be greatly reduced if the reprints are struck off while the article is in press. They are requested to notify the secretary and treasurer of the number of reprints desired when the article is submitted. Twenty copies of reprints are furnished authors free of charge.

Illustrations

Authors of articles submitted are urged to furnish with their manuscript any illustrations they may have in their possession for such articles. The Institute will gladly co-operate in obtaining such illustrations as may be suggested by authors.

Original photographs of objects and events which may be of interest to our readers are also desired, and members who have opportunities to obtain such photographs are requested to secure them for the Institute.

Notice

Whole Nos. 6, 7, 10, 13, 14, 15, 17, 144, 173 and 194 of the PROCEEDINGS are exhausted; there are so many calls for single copies of these numbers that the Institute offers to pay for copies thereof returned in good condition at the rate of 75 cents per copy.

INFORMATION INDEX

	PAGE
ADVERTISEMENTS, INDEX TO	I
PUBLICATIONS, U. S. NAVAL INSTITUTE	(2)
SPECIAL NOTICE	695
TOPICS FOR ESSAYS	697

PROFESSIONAL NOTES

PREPARED BY

LIEUTENANT R. A. HALL, U. S. Navy

GENERAL ARRANGEMENT

VESSELS BUILDING, NAVAL POLICY, MATÉRIEL, PERSONNEL, MERCHANT MARINE
France 645
Germany 648
Great Britain 650
Japan 655
United States 658
AERONAUTICS 663
ENGINEERING 672
NAVIGATION AND RADIO 676
ORDNANCE 678
MISCELLANEOUS 679
CURRENT NAVAL AND PROFESSIONAL PAPERS 680

FRANCE

FRENCH NAVY YARDS.—If the provisions made under the Guist'hau program are adhered to, the Brest and Lorient arsenals will specialize in cruisers and destroyer construction—Cherbourg will be entrusted with submarines, and Toulon will have quite enough with attending to fleet repairs. This arrangement will have the advantage of keeping some 24,000 arsenal workmen in nominal employment, but it is likely to mean slow work, as State arsenals have lost much of their efficiency through the war, and have only been able to repair half of the ex-Boche cruisers and torpedo craft allotted to the French Navy in 1919, with the result that the 8,000-ton cruisers, shortly to be laid down, may require four or five years before they are commissioned, which means that they will be outclassed when entering the service. There can be no true efficiency without quick construction; and here, unhappily, its inefficient arsenals are like a millstone round the neck of the Marine Française; and the worst is that there is little chance of remedy without stability and authority at the head.—*Naval and Military Record*, 15 February, 1922.

STRENGTH OF MEDITERRANEAN SQUADRON.—As from February 1 the French Mediterranean Squadron will be as follows: Battleships *Bretagne* (flying the flag of Vice-Admiral Salaun, the commander-in-chief), *France*, *Paris*, and *Jean-Bart;* two squadrons of destroyers, a squadron of submarines, and patrol vessels.

The personnel will be reduced by one-fifth of its present strength. The battleships *Provence* and *Lorraine* will be put into the reserve.—*Naval and Military Record*, 28 January, 1922.

NEW HYDROPLANES.—In the first week of December, Messrs. Thornycroft despatched from the Thames a new motor torpedo-boat, of the skimming or hydroplane type, for the French Navy. On trial the vessel attained a speed of 41.6 knots, or 47.9 miles an hour. The new vessel is practically of the coastal motor-boat class which during the war achieved such good results at Kronstadt, Zeebrügge, and elsewhere. Their design was developed in 1915 by Messrs. Thornycroft, largely as a result of experiments Sir John Thornycroft had begun nearly forty years previously. The construction of the first dozen of them was decided on by the admiralty early in 1916, and, in all, well over 100 were built by Messrs. Thornycroft and their licensees. The present vessel, which is the second ordered by the French Government—the other and rather smaller one having already been delivered—is 55 feet long, with a beam of 11 feet and a draught of 3 feet 3 inches. At first sight she does not look very impressive, but, thanks to her special construction, she can face heavy weather, and she carries the formidable armament of two 18-inch torpedoes, two depth charges, and four machine guns. For the sake of lightness and flexibility, she is built entirely of wood. There are two skins, both of Honduras mahogany, with a layer of oiled canvas interposed between them. The deck extends over the greater part of the length of the vessel, and constitutes an integral part of the structure. A third skin, worked in from the fore portion of the boat, and extending to amidships, forms a step about 3½ inches in depth, upon which the vessel rises as she gathers speed, and thus she obtains a skimming action over the surface of the water.—*Journal of the Royal Service Institution*, February, 1922.

DIRIGIBLES.—The French Government is maintaining a very reserved attitude over the question of airship construction. Before doing anything further it is awaiting developments and acquiring fresh experience which is believed to be necessary in view of the uncovincing results obtained with the dirigibles previously constructed in this country, and especially with the three German airships which were surrendered under the terms of the Versailles Treaty. The *Dixmude* was taken over by the Marine and was intended to be used for survey work over the Mediterranean and North Africa, but for some time past the German airship has been lying in its shed near Toulon waiting for repairs which the authorities are reluctant to carry out. As the *Dixmude* is already four years old, which is regarded as the normal life of an airship, it is feared that repairs will be continually absorbing large sums of money. The *L-133* has had to be taken down at Maubeuge before it could render any useful service, and the *Nordstern*, or *Méditerranée* as it is now called, is still waiting in its shed at St. Cyr until arrangements can be made for handing it over either to the military or naval services. It is feared that the *Méditerranée* will share the fate of the other airships. Dirigible balloons have not lost favor for military purposes. The authorities are merely of the opinion that it is prudent to await the results of technical investigations in this country, and of the progress being carried out elsewhere, before embarking upon the construction of new airships.—*The Engineer*, 27 January, 1922.

COAL-BURNING SHIPS BECOMING MORE POPULAR IN FRANCE.—According to information emanating from French shipbuilding centers, it appears that coal is again coming into favor, while oil-burning vessels

are becoming less popular. Although it is true that in recent times French shipbuilders arranged for oil consumption in their new vessels, coal furnaces, it is stated, are now being installed in greater numbers, due to the fact that while oil is holding its price fairly well, bunker coal has become comparatively cheap.

Until 1914 coal was almost exclusively employed for French vessels, the exceptions occuring in the case of warships and certain transatlantic liners where speed was more important than economical operation. Immediately after the armistice, however, owing to the pitiable state of the French coal mines, demoralized labor conditions and the high cost of coal, French shipowners and shipbuilders turned to oil. During the last few months, however, the price of coal having fallen 40 per cent and that of oil only 20 per cent in European ports, coal has again come into favor.

Although the advantage of oil fuel is admitted, and the lower cost and greater expedition of bunkering is recognized, there are many arguments in favor of relinquishing the use of oil-burning ships. At present, moreover, oil depots on the European coasts are too few and far between, with the result that many a cargo steamer which employs this fuel finds itself occasionally obliged to make a detour to reach a depot before supplies run out completely and thereby causing a loss for its owner which the use of coal would have prevented.—*Nautical Gazette*, 25 February, 1922.

MARSEILLES' GREAT CANAL.—While Marseilles claims to possess more extensive and modern harbor facilities than any other port on the Mediterranean Sea, the establishment of auxiliary subports northwestward along the coast has been found desirable and is being pushed, says Consul Wesley Frost.

From eight to fifteen miles northwest of Marseilles and separated from it by a high rocky ridge, is a series of lakes and inlets adaptable for port development. Accordingly, a huge ship canal is being driven through the promontory to connect Marseilles with these inlets and their present small ports of Martigues, Port-de-Bouc, and Caronte. The canal is also being extended farther westward to the mouth of the Rhone to connect with the lateral canal running down the Rhone from the north.

As an engineering task this canal surpasses any project undertaken in any part of the world since the construction of the Panama Canal. It involves the construction of a continuous four-mile tunnel through the ridge, with a cross section six or seven times as great as that of any existing railway tunnel. On emerging from the subterranean passage, the canal flows in the open channel of Gignac, 2 kilometers in length, with a depth of 30 meters. It then follows the south bank of the lake of Bolmon and of the lake of Berre as far as Martigues.

There it joins the canals already in existence between Martigues and Port-de-Bouc, and from Port-de-Bouc to Arles, joining the Rhone at the latter point by a lock 160 meters in length and 16 meters in width. Throughout its entire course of 81 kilometers, the canal is on sea level.

The depth of the canal between Marseilles and Port-de-Bouc is 4 meters (13 feet), and between Port-de-Bouc and Arles 2.5 meters (8 feet). In those sections where there is a current the canal has a width of 25 meters at 2 meters below the surface of the water. In the Rove tunnel the width is reduced to 18 meters; but this will allow the passage in continual movement in both directions of two sea barges of 3.75 meters draft, able to carry 1,200 metric tons of cargo.—*Nautical Gazette*, 25 February, 1922.

GERMANY

GERMANY AND AVIATION.—The recent announcement by the Council of Ambassadors that the treaty restrictions on the manufacture of German aircraft are to be lifted on May 5, is one of the most important events of the present period of the development of aviation. Germany has occupied a peculiar position in the development of aircraft ever since 1914. In the construction of lighter-than-aircraft she has excelled the efforts of the rest of the world. This is because she has always placed great confidence in them while the other nations have been somewhat doubtful as to their utility.

In the heavier-than-air field, German designers have been laboring under various restrictions ever since the naval blockade went into effect during the war. The lack of materials forced them to develop many ingenious expedients, while at the same time many valuable lines of investigation were absolutely closed to them. After the war the Allied aircraft prohibition that has been in effect until Germany complied with her treaty obligations, virtually stopped any new construction to date.

The terms of the Versailles Treaty prohibit Germany from having any military aircraft and very greatly limit her sea fleet. The enormous tonnage of merchant marine that she has been required to turn over in payment for the Allied and neutral ships wantonly destroyed during the war, has inclined many influential Germans to the view that she will have to take to the air if she is to regain her lost commercial prestige. The combination of these factors has resulted in the production of some remarkable commercial aircraft designs.

There can be no doubt that the various German aircraft manufacturers will attempt to sell airplanes abroad. There are many who feel that the Americas, and in particular the United States are the most promising fields for exploitation. In this country foreign airplanes are subject to a high tariff and are required to pay for patent licenses. It is a serious problem and one worthy of very earnest consideration by all interested in the American industry, whether or not the low operating cost of the German designs will not far outweigh their high first cost, particularly in view of the rate of exchange and the cost of foreign labor. It is certain that from the operating cost standpoint, war surplus machines will be hopelessly outclassed in regard to their use as *transport* machines.

The more general aspects of the revival of competition are also to be debated. There are many people who feel that the removal of the restrictions constitute a menace to civilization on the ground that the machines to be constructed will constitute a potential air force as the manufacturing facilities can be readily diverted to war use. It is an old adage that states that competition is the life of business. There can be no doubt that German competition will greatly stimulate manufacturers both here and abroad toward new developments.—*Aviation*, 20 February, 1922.

NORTH GERMAN LLOYD RESUMES TRANSATLANTIC SERVICE.—After a lapse of more than seven years the North German Lloyd has resumed its passenger and freight service between Germany and the United States, and three vessels have been placed on the run between New York and Bremen. These are the *Seydlitz*, *Hannover*, and *Yorck*, each of about 9,000 tons, which have been reconditioned and fitted to carry 200 cabin and 1,000 third-class passengers. The service will be inaugurated by the *Seydlitz* which leaves Bremen on February 11, arriving at New York on February 23 and departing on the return trip on March 1. Thereafter a fortnightly service will be maintained. The company has opened its New York headquarters at 18 Pearl Street, and its steamers will

load and discharge at the North German Lloyd Pier at the foot of Sixth Street, Hoboken,—*Nautical Gazette*, 4 February, 1922.

GERMAN SHIPBUILDING AND SHIPPING.—The report of the Hamburg Chamber of Commerce for 1921 refers to the agreement concerning State compensation to the shipping concerns, according to which an aggregate compensation of 1,200,000,000 marks was settled in February. The distribution of this sum was left in the hands of a body of representatives of shipyards and shipowners, under the name of the Shipbuilding Bank, Hamburg.

An efficient distribution of this sum was impeded by alterations in the German home prices and by the adverse necessity of spending 90 per cent of the amount on orders to German shipyards. This prevented German shipowners from contemplating the possibility of buying back on a somewhat large scale former German vessels. The assumption that one third of the former German tonnage could be rebuilt by the aid of the compensation fund would appear, under the circumstances, to be an extremely problematical one. Wages and the prices for shipbuilding steel are now considerably higher than in February, 1921. The plan of the buying bureau for ship steel, according to which material would be delivered in future to the German shipyards only on the basis of foreign exchanges, appears to be simply prohibitive and liable to frustrate the solution of the unemployment problem, an end which was also in view when the compensation agreement was entered into.

German shipping particularly regrets that it is handicapped in many countries; thus German boats are excluded from coasting traffic in Sweden; Italy, also, has deprived Germany of shipping. In the United States the alien tonnage tax has to be paid. Britain supports her own passenger traffic. The Dardanelles are still closed to the German flag, nor are German vessels allowed to enter any ports in Morocco. We may here add that all these measures are most mild compared with those which Germany would probably have taken had she won the war.

Germany, however, is endeavoring to extend her shipping in various ways, and in Holland, amongst other countries. This refers more especially to the Royal Dutch Lloyd, but this scheme is said to have of late experienced financial difficulties. The first German bid is understood to have been declined as inadequate; negotiations are, however, being proceeded with. Germany tried once before to obtain the control of this Dutch company, namely, in 1906, when the Hamburg-America Line and the North German Lloyd made a bid for 60 per cent of the share capital of the Holland-South America Line, which was then in difficulties and was transformed into the Royal Dutch Lloyd. A Dutch concern made the same bid as Germany and carried the day.

The Howaldt yard in Kiel, which pays 24 per cent dividend for the last financial year, as against 20 per cent for the previous twelve months, is well supplied with orders for the current year; these orders will also keep the yard partly employed for the year following. This in spite of the yard having been deprived of a number of contracts for new vessels on account of the State not having been able fully to carry out its promises of help towards the reconstruction of the German merchant navy. The repair of vessels, especially foreign ones, has materially contributed to the satisfactory result. The company's share in the Holstein iron works at Rendsburg is said to have been sold to the Rombach iron works on favorable terms.

The Deutsche Werke Company, the former Imperial yard at Kiel, and the works at Spandau, in which the German State is interested to

the extent of 100,000,000 marks of ordinary shares and 330,000,000 marks of "certificates," which participate in a dividend above 5 per cent has, rather late in the day, issued its report for the period June 17 to December 31, 1920. Of the profits, amounting to 171,400,000 marks, general expenses absorbed 57,800,000 marks and reserves and writings-off 113,100,000 marks. Both at Kiel and Spandau a number of workmen had to be discharged in the course of the period under review. The fact that the company had to find employment for a larger percentage of badly disabled men than other concerns is said to have had a detrimental effect upon the financial results.—*Engineering*, 17 February, 1922.

KIEL CANAL TRAFFIC.—In 1921, 31,910 vessels of 9,506,466 net register tons passed through the Kiel Canal. Of these, 19,206 were steamers of 8,093,663 tons.

The nationalities of these vessels were as follows:

	Vessels
German	25,349
Swedish	1,509
Dutch	1,026
Norwegian	767
British	663
Finnish	295
American	227
Danish	155
Danziger	143
French	129
Russian	95
Belgium	39
Japanese	14
Others	97
	31,910

No less than 15,381 vessels of 4,429,987 passed through the canal going east, and 16,529 vessels of 5,076,479 tons passed through in the opposite direction.—*Nautical Gazette*, 15 February, 1922.

GREAT BRITAIN

THE NAVY ESTIMATES.—More than ordinary interest will attach to the navy estimates for the forthcoming financial year. They will doubtless reflect in some measure the decisions of the Washington Conference, though not, perhaps, to such an extent as some people suppose. The vote for new construction will probably be diminished by the cancellation of the four battle-cruisers, but, if the Government decide to push on with the two-battleship program without delay, this vote will still remain at a fairly high figure. From a recent statement by the Prime Minister is seems that a decision in regard to the two ships has not yet been reached, and that the matter will remain open until Mr. Balfour has made a full report of the Washington transactions to the Cabinet. It is no secret, however, that strong pressure is being brought to bear on the Admiralty with a view to securing their consent to a further postponement of capital ship construction. The Sea Lords will have to fight hard for their two ships, which are absolutely essential if the British Navy is to maintain its relative standing.

Another danger to the Navy is the Geddes axe, which is seen to be hovering menacingly over the personnel; but we do not believe that the public, despite its anxiety to see expenditure curtailed, would approve any measure which threatened to destroy naval efficiency. Irrespective of the Geddes recommendations, the navy estimates will probably show a fall of twenty millions, as compared with those of last year, in which case they will approximate to £60,000,000. In view of the immense increase in the cost of everything required by the service,

this sum is equivalent to little more than thirty millions on the pre-war scale of value. It is altogether misleading to compare naval expenditure before and after the war without making due allowance for the depreciation in the purchasing power of money.—*Naval and Military Record*, 15 February, 1922.

NAVAL PROBLEMS TO BE SOLVED.—The prolonged era of peace which preceded Armageddon had not undermined the cardinal tradition of the British Navy, to seek out the enemy and destroy him, but it may be doubted whether sufficient attention had been paid to the methods of search. The veriest tyro in naval matters must have forseen that, in view of British preponderance in strength, an Anglo-German war at sea would largely resolve itself into a game of hide-and-seek, and that the enemy would employ his forces, especially those in foreign waters, to create diversions with the object of compelling us to detach ships from the main body, thereby reducing our margin of superiority in the main arena. As all this must have been clearly appreciated by those responsible for the war training of the Navy, it is the more surprising that so little was done to prepare for contingencies so patent to every discerning eye.

It is impossible to read Sir Julian Corbett's narrative of the *Goeben* affair without a feeling that events would have taken a very different course had the problem of locating and intercepting an enemy force been studied more closely beforehand. The quarry in this case was known to be in a certain well-defined area, with a very limited choice of exits, and our available force was not inadequate for the work in hand; yet the result was complete failure. In other zones the task of hunting down isolated enemy cruisers involved the employment of a great many ships—sometimes the ratio was as high as ten to one—whose withdrawal gravely handicapped operations elsewhere, and more than once led to a serious reverse. If, therefore, the teachings of the war have been taken to heart, such future maneuvers as a depleted purse may render possible will not be confined to the realm of grand strategy, but will no doubt extend to the elucidation of such problems as we have indicated above, and which have invariably cropped up in every naval campaign in which we have been engaged.—*Naval and Military Record*, 8 February, 1922.

NAVAL ECONOMY.—In any consideration of the Geddes report so far as the Navy is concerned, it is recognized fully that the interests of the country require that economy in public expenditure shall be exercised to the utmost limit, and that a reduction of the Naval Service is inevitable. It is, moreover, possible to acquiesce in such a reduction because there are no probable enemies in view. The expenditure on the Navy is an insurance for our very existence, but since the risks against which we insure are less, the premium can—for the present—be safely reduced. The question at issue is rather as to how the cuts are to be made. Here it must be pointed out that the Admiralty indicated their policy no less than two years ago, in the first Memorandum by the Board after the armistice. "Since sea power is essential for the security and prosperity of the British Empire," said this Memorandum, "it is the object of the Board of Admirality to proceed on lines which they believe will provide us with our vital requirements, and at the same time secure the exercise of rigid economy." How has this object been carried out?

In regard to material, the reductions effected are well known, and an excellent indication of them was afforded by the fact that of the nineteen capital ships which Mr. Hughes proposed at Washington to scrap, eleven had already been placed on the disposal or non-effective lists before he spoke. A much more intricate and difficult problem has been the re-

duction of the personnel, but this has been carried out gradually and without violent interruption to the work and progress of the Service, until the total is now down to about 120,000. In view of the Washington agreements, this is expected to come down to about 100,000, or 51,000 less than the number provided for in the last estimates before the war. More recently the Board have been engaged in what may be termed the third stage of their economies, one which follows naturally upon the discharge of the surplus personnel and the provision of a nucleus of young seamen for post-war needs— the concentration of the work of the training establishments. Chatham and Devonport are to lose their signal training schools, it is understood, the work being centralized at Portsmouth. In the same direction, too, is the substitution of the light cruiser *Yarmouth* for the armored cruiser *Antrim*, as signal and wireless experimental ship at Portsmouth. There is nothing new in this sort of thing; it has been constantly going on ever since the armistice, and quite apart from anything suggested by the Geddes Committee.

There is a certain limit, however, beyond which, if we are to have a fleet at all—and an inadequate or untrained fleet is worse than useless —the Board cannot go. It takes many years under modern conditions, to make a sailor, and it is essential not only that there shall be a nucleus of skilled men, but that provisions shall be made for ships and establishments in which they can keep themselves efficient. We need, that is to say, a navy for training purposes, and one in which there is constant progress in the direction of experiment and research, with adequate provision for staff work and studies. It will be fatal to future efficiency if these essentials are tampered with to save more money on the estimates. If the Sea Lords have a free hand they can save even larger sums without jeopardizing the well-being of the Service as a whole. Last year, for instance, the Board decided that they had no further use for Pembroke Dockyard, but political influence frustrated the proposal to close this establishment. Similar economies in the civilian departments have been watered down because those who would be affected by them are able to organize political, trade union, or other opposition. Left to their own resources, the Admiralty have shown what they can do in the way of economical administration, and they may well say, as Lord Fisher did when he was engaged in a similar task fifteen years ago, "Don't spur a willing horse."—*Army, Navy, and Air Force Gazette*, 18 February, 1922.

THE PACIFIC AGREEMENT.—Another important step has been taken in connection with the preliminary work of the Washington Conference by the publication of the much-discussed Article XIX of the Naval Pact, dealing with the areas in the Pacific in which the *status quo* is to be maintained in regard to fortifications and naval bases. Only incomplete cabled summaries are to hand at the moment of writing, and in any case this section like the other parts of the proposed treaty cannot come into effect until the Powers concerned have ratified its provisions. At the same time, the measure of agreement reached between the various nations through their representatives at Washington is of special interest and importance. Although the *status quo* mainly concerns Great Britain, America and Japan, there are within the wide zone covered by it certain islands belonging to Holland and France. These islands, however, are not directly concerned, since it is very unlikely that either of the latter Powers is going to increase its fortifications out there—it would have less reason than ever to do so after the signing of such a compact as that now published.

In considering the article in its broadest aspect, it is interesting to note what are considered to be the limits of the Pacific. The neutral

zone, as it may be called, within which the Powers agree that no new fortifications or naval bases shall be established, and that no measures shall be taken to increase existing naval facilities for the repair or maintenance of naval forces, extends from 160 degrees west of Greenwich, which is about the longitude of the Hawaiian Islands, on the one side, to 100 degrees east of Greenwich, on the other. It includes Hong Kong, the Philippines, Guam, Bonin, Formosa, and the Pescadores. On the north it extends to about 60 degrees, incorporating the Aleutian and Kuriles Islands, and on the south it extends to about 30 degrees, or as far down as Norfolk Island, which is excluded from its provisions. Certain ex-German territories in the Pacific, such as Yap, were already debarred from being fortified under the terms of the mandates granted in regard to them under the Peace Treaty.

As regards the places outside the proposed zone, it would be well to await the full text before offering criticism. Cabled reports, however, show that on the American side the coasts of the United States and Canada, Alaska, and the Panama Canal zone are excluded from the agreement. So, too, are the Hawaiian Islands, where at Pearl Harbor the Americans have established a base, with a large dry-dock capable of taking ships of any dimensions. On the opposite side of the Pacific, the French settlement of Saigon and the British port of Singapore are both outside the limits of the agreement, and also the Dutch East Indies. On the south, the Commonwealth of Australia *and its territories*, and New Zealand, do not come within the scope of the proposal. It will be interesting to learn in due course how far the term "territories" applies, and whether, for instance, it includes the territory of Papua, previously known as British New Guinea, in the same way that it does Tasmania.

From what is known of the treaty so far, it obviously must, if carried out, prove more beneficial to Japan than to any other Power, for it removes the possibility of places in a position to be inimical to her security being fortified. The United States virtually gives up the right to construct that chain of naval bases between the homeland and the Philippines which several recent writers have shown would be necessary for the security of the latter in time of war. As Mr. H. C. Bywater said in his recent volume, *Sea Power in the Pacific*, the Philippines must be guarded by naval force or not at all, "and as the lack of a well-found fleet base near at hand puts effective naval protection out of the question for the time being, the islands would doubtless fall an easy prey to Japan in case of war with the United States." Japan, on the other hand, which is already well-nigh impregnable, as Admiral Ballard has shown, to direct attack, as a result of great natural advantages of position, combined with success in war and wisdom in diplomacy, will be rendered more secure than ever by the adoption of the new Naval Treaty, always providing, of course, that the spirit of the renewal and replacement clause is interpreted aright by the signatory Powers.—*Army, Navy, and Air Force Gazette*, 11 February, 1922.

MEDITERRANEAN EXERCISES.—The combined exercises taking place "up the Straits" this week between the Atlantic and Mediterranean fleets scarcely justify the term "maneuvers" which has been applied to them in some of the papers. For one thing, as the Admiralty have enjoined strict economy in the consumption of fuel, those periods of steaming at high speed which are essential if fleet exercises are to be conducted on a realistic scale will be impossible. A good many years have elapsed since the British Navy engaged in full-dress maneuvers, and in view of the needs for economy there is not much likelihood of their being

repeated in the near future. This is to be regretted, for many problems of strategy and tactics suggested by the war still await solution, and the only practical way of solving them is to employ the fleet in conditions approximating as nearly as possible to those of war.

Whether maneuvers after the conventional pre-war fashion, in which most of the time was taken up by movements and counter-movements on the part of "Red" and "Blue" battle fleets, afforded the best preparation for the "real thing" is a point on which service opinion is divided. While it is, of course, essential that frequent opportunity should be afforded to senior and flag officers to handle large formations at sea and master the difficult art of keeping the enemy under the maximum volume of fire throughout every intricate movement, many officers believe that more time should be allotted to the study of those subsidiary operations which the late war showed to be scarcely less decisive in the final analysis than the clash of opposing battle fleets. Who will deny, for instance, that the escape of the *Goeben* had consequences at least as weighty as those produced by any other naval event of the whole struggle?—*Naval and Military Record*, 8 February, 1922.

NAVAL OFFICERS AS CONSULS.—The Foreign Office, it seems, finds a difficulty in staffing the Consular Service in the Far East, good recruits being by no means plentiful. Lord Northcliffe recently described how the British Consuls out there are badly housed and grossly overworked. Some of the best men, the Consular Department officials declare, are induced to leave their posts by the offer of larger salaries from merchants. We put forward some time ago in this journal a plea for the utilization of retired naval officers in this work, and in view of the state of things now revealed such a policy would evidently be an advantage to the officers and the State. While £800 a year is apparently insufficient to attract young men who have more lucrative prospects elsewhere, it would be welcomed by many officers who have been obliged to leave the Navy owing to the post-war reductions, and whose experience of foreign ports would stand them in good stead in the Consular Service, especially if they could be given a brief course of instruction in trading matters. The value of a seaman in this connection was demonstrated when the *Dresden* escaped into hiding after the Falklands victory in 1914, for of all the people concerned in the search there was only one who found her out, and this was the British Consul at Punta Arenas, Mr. Milward, who had followed the sea in his youth, and whose knowledge enabled him to trace the locality to which the *Dresden's* supplies were going. We recommend the moral of this incident to the attention of the Foreign Office.—*Army, Navy, and Air Service Gazette*, 28 January, 1922.

NAVAL PRISONS.—It is, in a way, evidence of the better class of men now in the Royal Navy that on March 31 the only remaining naval prison, at Bodmin, is to be closed. Twelve years ago there were three such prisons, the others being at Portsmouth and Lewes, but there was a reduction to one after the coming into force of the Naval Discipline Amendment Act of 1909, which provided that offences against discipline might be dealt with by detention, for which purpose detention quarters were provided at each naval barracks. Bodmin naval prison has accommodation for a hundred of the men, but nothing like this total has been there of late years. The average daily number in 1920 was only thirty-four, and it is understood that there was a still further decrease last year. In these circumstances there would seem to be no need whatever for keeping on the establishment, especially since arrangements could be made with the War Office for the accommodation of offenders at the military prison at Woking. The

current estimates show that there is a staff of sixteen at Bodmin—nearly as many as the prisoners—and that the votes for salaries, warders' uniforms, and the like run into nearly £6,000 a year, besides the cost of the upkeep of the prison buildings. So on all grounds the Navy is glad to see the last of its prisons. It could be wished that every economy was as popular with most people as this one.—*Army, Navy and Air Force Gazette,* 4 February, 1922.

BRITISH DESTROYERS FOR FINLAND.—England has offered to Finland at a very low figure six destroyers built in 1914. The chief of the Finish Naval Staff has left for London with a view to buying the ships.—*Naval and Military Record,* 8 February, 1922.

ADMIRALTY ORDER FOR VICKERS, LTD.—A Barrow message states that Vickers, Ltd., are in receipt of an Admiralty order to construct Diesel engines for a minelayer to be built in the Government dockyard. Whilst there is no official confirmation, there is no denial, and the report is believed to be correct.—*Engineering and Industrial Management,* 19 January, 1922.

DRY-DOCKING OF H. M. S. VICTORY.—Whether the famous flagship of Nelson has now been towed to her final resting place is not yet known, but there will be no surprise if it is decided to keep her permanently in dry-dock No. 2, where she now lies. The vessel will be carefully surveyed, but experts who have had access to the reports made after the earlier examination made when the *Victory* was at her old moorings in Portsmouth Harbor do not think it will be safe to float the ship again. The greatest care was exercised to ensure that she settled correctly on the blocks, and other precautions taken to avoid any undue straining of the hull. It is an advantage that the dry-dock in which the ship now rests is very accessible to the public, being in close proximity to the main gates of the dockyard, and that the dock is not likely to be required for any other purpose.—*Engineering,* 27 January, 1922.

JAPAN

JAPANESE SHIPBUILDING POLICY.—The Japanese press refers to a meeting held in Tokyo on December 23 at the official residence of the Naval Minister, those present including four members of the House of Peers, who are particularly interested in naval affairs, and several high officials of the Navy Department. Vice-Admiral Ide, who is acting for the Minister during the latter's absence in Washington, explained the navy estimates and replied to questions touching the effects of the American limitation scheme. He stated, *inter alia,* that Japan had endeavored to secure some modification of the naval holiday in order to mitigate the severity of its reaction on the shipbuilding industry, and had also claimed the same ratio of tonnage for aircraft-carriers as was proposed for America and Great Britain; but on both points she had been overruled. Vice-Admiral Okada, the director of naval construction, assured the meeting that even after the construction of capital ships had been suspended, the building of subsidiary vessels would be pushed on. Furthermore, in order to alleviate unemployment, measures would be taken to accelerate the building of some special service ships which it was originally intended to have laid down in the fiscal years 1924 and 1925. These statements appear to corroborate previous reports as to the Japanese intention of building cruisers and lesser craft in place of the cancelled dreadnoughts. As for the "special service ships," which include gunboats, mine-layers, oil-tankers, etc., eighteen of these were authorized under the "eight-eight" project. The cruiser program

is fairly large. It comprises about seven ships building and eight not yet laid down. When to these are added the many destroyers and submarines provided for in the "eight-eight" scheme, the aggregate of tonnage to be completed becomes quite large, and if the Navy Department adheres to its resolve to substitute smaller vessels for the abandoned capital ships, Japanese shipbuilders should have no reason to complain of any dearth of orders.

The Navy Department has not yet decided how to dispose of the uncompleted capital ships affected by the Washington agreement. The battleships *Kaga* and *Tosa* are already afloat, but the battle cruisers *Amagi* and *Akagi* remain on the stocks, and will almost certainly be launched, Japanese experts agreeing that less expenditure is involved in the breaking-up of warships after they have been launchd than in dismantling them as they lie on the slip. Work on the battle cruisers *Atago* and *Takao* is proceeding at a leisurely rate, and will not be definitely suspended until the return of the Naval Minister, Admiral Baron Kato. Laborers at the Kure Arsenal continue to agitate for a large bonus in the event of their discharge, and there is much unrest at the other shipyards, both state-owned and private. Even the staunchest advocates of naval retrenchment now admit that a complete cessation of warship construction would probably lead to grave disorders, owing to the high proportion of Japanese wage-earners dependent on such work.

Admiral Chisaka, director of the Kure Naval Academy, is credited with the statement that, owing to the naval limitation scheme, the number of first and second-year students will shortly have to be reduced by half, and that naval cadets would be well-advised to cast about for alternative careers in view of the impending diminution of the fleet.—*Naval and Military Record,* 15 February, 1922.

MANUFACTURE OF AEROPLANES IN JAPAN.—The Mitsubishi Motor Co., at Nagoya, has made progress in the work of manufacturing its new type of aeroplane, and will soon be turning out complete machines. The company's application for permission to establish an aviation field in front of its works at the port has received official sanction.

A trial flight with an experimental aeroplane completed by these works, in which a 300-horsepower Hispano-Suiza motor was installed, showed satisfactory results. The aeroplane was constructed after the plan of a British engineer; while the details of construction are kept secret, it is said to be a high-speed fighting plane, to be known as the Mitsubishi type. The company plans to undertake construction of this type of biplane.

Work has been started by the *Aichi Tokei Denki Kabushiki Kaisha* (Aichi Clock & Electric Machinery Co., Ltd.) on the construction of a factory in the neighborhood of Nagoya to which the works of the company now at Atsuta, will be moved. It is expected that the factory will be completed by the end of 1922. The present works are capable of turning out one aeroplane a month, of the Yokosho type; the new factory will have a capacity of fifty planes a month. Besides the manufacture of airplanes for military purposes, special attention will be given to the production of large commercial planes.

The Kawasaki Works of Kobe are contemplating the erection of aeroplane factories in the Gifu Prefecture. Construction was scheduled to be started in November, 1921, and to be completed in the spring of 1922, when 500 workmen will be detached from Kobe to engage in the manufacture of aeroplanes.—*Aerial Age Weekly,* 27 February, 1922.

BIG JAPANESE FIRM ACCUSED OF DEFRAUDING GOVERNMENT.—Charges that the Kawasaki Dockyards Company for ten years has been forging seals of approval on materials for warships, merchant vessels, railway cars, and

other large products, which have been rejected by inspectors of Lloyds, the Navy and the Japanese Railway Department, thereby profiting by 5,000,000 to 10,000,000 yen ($5,000,000), are made through the columns of the Japanese press. Kojiro Matsukata, president of the company, denies the charges, saying:

"The alleged scandal is merely the work of laborers who were dismissed from our plant because of lack of discipline." It is generally believed that men discharged from the plant last summer are responsible for the publicity at this time.

The *Tokio Asahkio* publishes a photograph alleged to be of a false seal. Mr. Kawashima and Tomitaro Shibata, members of the Kobe branch of the Japan League of Labor, have issued the following statement:

"The Kawasaki dockyards have been deliberately deceiving the authorities. We have good evidence of this. The dockyards are supposed to supply materials according to a fixed standard, but have been supplying bad materials by use of false seals.

"In view of the large loss through machine parts failing to pass inspection, the company especially made test pieces to be used to deceive the inspectors. With these and false seals which the company ordered made, the company has been carrying on deceit on a gigantic scale, of which we now possess six cases of evidence."

The statement further declares that Navy Inspector Onodera is alleged to have had knowledge of the forgeries.—*Philadelphia Public Ledger*, 20 February, 1922.

JAPAN AND ARMAMENTS.—The Japanese Embassy announces that it is unofficially reported from Tokio that it has been decided to reduce Maizuru. hitherto one of the most important naval stations in Japan, to the rank of a naval port.

It is further stated that the naval station of Port Arthur will be thrown open before long as an ordinary commercial port or open harbor.

With regard to the Army, the Kokuminto party (nationalists) proposed a measure to the Diet for reducing the army by one half. The Government party, while not going so far as the Nationlists, has introduced a bill in the House of Representatives with the object of reducing the personnel of the army and effecting reforms in the scope of organization.—*Naval and Military Record*, 15 February, 1922.

JAPAN'S SHIPBUILDING OUTPUT.—At the present time there are fourteen Japanese shipbuilding establishments capable of constructing ocean-going merchant ships as compared with a total of fifty-three yards in 1918. Of these fourteen plants only nine are actually engaged in new construction. The output of Japanese yards has fluctuated as follows since 1913:

Year	No. of Ships	Gross Tons
1914	16	78,010
1915	8	40,485
1916	40	141,827
1917	89	348,430
1918	189	518,786
1919	136	621,513
1920	93	433,265
1921	40	*190,000

*Estimated.

The largest merchant vessel built last year was the twin screw steamer *Hakone Maru* of 10,500 gross tons, which was constructed at the Nagasaki works of the Mitsubishi Shosen Kaisha for the Nippon Yusen Kaisha. She is a combination passenger and cargo carrier and has a speed of 16 knots. Her propelling machinery consists of two sets of Parsons double-reduction geared turbines.

For the Toyo Kisen Kaisha, the Asano Shipbuilding Company completed in 1921 the *Biyo Maru*. This is the first electrically propelled steamer to be built in Japan. She is reported to be giving every satisfaction in service and to consume very little fuel as compared with sister cargo carriers fitted with geared turbines. She is of 8,800 tons deadweight.

Last year also witnessed the completion for the Teikoku Steamship Company of the steamers *Tachibana Maru* and *Manju Maru* designed for the carrying of oil in bulk. They are of 8,800 tons deadweight and were built on the Isherwood plan at the Harima yard of Messrs. Suzuki & Co. These two vessels, together with the *Kiyo Maru* and a small iron tanker, are the only privately-owned tank steamers under Japanese registry.—*Nautical Gazette*, 11 February, 1922.

UNITED STATES

NAVY DEPARTMENT

BUREAU OF CONSTRUCTION AND REPAIR

WASHINGTON, D. C., FEBRUARY 10, 1922.

VESSELS UNDER CONSTRUCTION, UNITED STATES NAVY—PROGRESS AS OF JANUARY 31, 1922

Type Number and Name		Contractor	% of Completion Feb. 1, 1922 Total	Feb. 1, 1922 On Ship	Jan. 1, 1922 Total	Jan. 1, 1922 On Ship
		BATTLESHIPS (BB)				
45	*Colorado*	New York S. B. Cpn.	87.9	86.8	86.	84.9
47	*Washington*	New York S. B. Cpn.	75.3	69.4	69.8	63.6
48	*West Virginia*	Newport News S. B. & D. D. Co.	73.	69.2	70.	65.4
49	*South Dakota*	New York Navy Yard	38.5	31.6	38.	31.1
50	*Indiana*	New York Navy Yard	34.6	27.1	34.3	26.8
51	*Montana*	Mare Island Navy Yard	27.6	19.	27.6	19.
52	*North Carolina*	Norfolk Navy Yard	36.7	27.1	36.7	27.1
53	*Iowa*	Newport News S. B. & D. D. Co.	31.5	27.1	31.2	26.5
54	*Massachusetts*	Beth. S. B. Cpn. (Fore River)	11.	4.3	11.	4.3
		BATTLE CRUISERS (CC)				
1	*Lexington*	Beth. S. B. Cpn. (Fore River)	33.2	23.4	31.1	21.4
2	*Constellation*	Newport News S. B. & D. D. Co.	22.3	19.1	20.	17.6
3	*Saratoga*	New York S. B. Cpn.	33.7	26.7	32.4	25.4
4	*Ranger*	Newport News S. B. & D. D. Co.	4.	1.5	3.8	1.4
5	*Constitution*	Philadelphia Navy Yard	13.3	8.3	12.8	7.8
6	*United States*	Philadelphia Navy Yard	12.	7.	11.8	6.8
		SCOUT CRUISERS (LIGHT CRUISERS) (CL)				
4	*Omaha*	Todd D. D. & Const. Cpn.	99.2	94.3	99.	93.
5	*Milwaukee*	Todd D. D. & Const. Cpn.	94.	86.5	93.6	86.2
6	*Cincinnati*	Todd D. D. & Const. Cpn.	88.	81.6	87.6	81.2
7	*Raleigh*	Beth. S. B. Cpn. (Fore River)	63.7	45.6	63.7	45.6
8	*Detroit*	Beth. S. B. Cpn. (Fore River)	79.1	64.8	76.9	61.6
9	*Richmond*	Wm. Cramp & Sons Co.	85.	79.	83.	77.
10	*Concord*	Wm. Cramp & Sons Co.	82.	75.	79.	71.
11	*Trenton*	Wm. Cramp & Sons Co.	57.	46.	55.	43.
12	*Marblehead*	Wm. Cramp & Sons Co.	47.	33.	47.	33.
13	*Memphis*	Wm. Cramp & Sons Co.	40.	26.	40.	26.
		AUXILIARIES				
Repair Ship No. 1, *Medusa* (AR1) Puget Sound Navy Yard			75.9	66.6	74.1	62.7
Dest. Tender No. 3, *Dobbin* (AD3) Philadelphia Navy Yard			67.5	67.2	66.9	66.6
Dest. Tender No. 4, *Whitney* (AD4) Boston Navy Yard.			49.6	40.4	47.1	37.8
Sub. Tender No. 3, *Holland* (AS3) Puget Sound Navy Yard.			21.5	5.5	21.5	5.5
		PATROL VESSELS				
Gunboat No. 22, *Tulsa* (PG22), Charleston Navy Yard.			72.	59.	71.3	57.5
		DESTROYERS				
339	*Trever*	Mare Island Navy Yard.	99.6	99.6	98.8	98.8
340	*Perry*	Mare Island Navy Yard.	87.7	87.7	86.	85.7
341	*Decatur*	Mare Island Navy Yard	83.3	83.3	82.1	81.8

Destroyers authorized but not under construction or contract (12) Nos. 348 to 359 inclusive.

Under Construction: 4 fleet submarines and 37 submarines. Authorized but not under construction or contract: 6 fleet submarines and 1 submarine.

BIDS FOR NAVAL SPOTTERS.—The Bureau of Aeronautics of the Navy has just asked American airplane manufacturers for bids on a small number of a new spotting seaplane, designed by the construction division of the Naval Bureau of Aeronautics, the details of which are not revealed. These planes are to be used for spotting the fire of the guns of the fleet, and it is believed they will be small fast craft carrying two or three men. Detailed plans of the new seaplanes have been submitted to airplane manufacturers, so that they can make definite bids for three each, though the total number to be ordered was not announced.—*Aviation*, 20 February, 1922.

JANUARY SHIPBUILDING OUTPUT IN DETAIL.—The Bureau of Navigation, Department of Commerce, reports seventy-one sailing, steam, gas, and unrigged vessels of 52,764 gross tons built in the United States and officially numbered during the month of January, 1922, as follows:

	Atlantic and Gulf		Pacific		Great Lakes		Western Rivers		Total	
	No.	Gross	No.	Gross	No.	Gross	No.	Gross	No.	Gross
WOOD										
Sailing	1	8	1	17	..	....	..	....	2	25
Steam	..	....	..	....	..	....	2	157	22	157
Gas	20	277	3	33	1	12	5	52	29	374
Unrigged	23	8,955	3	583	..	....	3	121	29	9,659
Total	44	9,240	7	633	1	12	10	330	62	10,215
METAL										
Sailing	..	....	..	....	..	....	..	....	..	....
Steam	6	32,609	1	9,838	..	....	..	....	7	42,447
Gas	1	86	1	16*	..	....	..	....	2	102
Unrigged	..	....	..	....	..	....	..	....	..	....
Total	7	32,695	2	9,854	..	....	..	....	9	42,549
TOTALS										
Sailing	1	8	1	17	..	....	..	....	2	25
Steam	6	32,609	1	9,838	..	....	2	157	9	42,604
Gas	21	363	4	49*	1	12	5	52	31	476
Unrigged	23	8,955	3	583	..	....	3	121	29	9,659
Grand total	51	41,935	9	10,487*	1	12	10	330	71	52,764

*Includes one composite vessel of 16 gross tons.

The above total includes twenty-nine rigged vessels of 10,541 gross tons and twenty-four unrigged vessels of 9,283 gross tons, total fifty-three vessels of 19,824 gross tons built in years previous to 1922. Of the above total, one vessel of 14,187 gross tons was built for the United States Shipping Board.

The largest vessel built during the month was the *Peninsula State* of 14,187 gross tons. Other large vessels include the *W. S. Rheem*, 9,838 gross tons, *Delaware Sun*, 8,964 gross tons, and *Macy Willis*, 7,096 gross tons.—*Nautical Gazette*, 18 February, 1922.

TABLE OF PROPOSED NEW BASE PAY AND ALLOWANCES.—This table embodies the provision for service pay and allowances in the bill as drafted by the joint Congressional Committee. While in this compilation the titles used are those of the Army, the rates apply, of course, to corresponding grades of the other services.

—*Army and Navy Journal*, 25 February, 1922.

LEVIATHAN CONTRACT AWARDED TO NEWPORT NEWS YARD.—The Shipping Board has decided to award the contract for reconditioning the liner *Leviathan* to the Newport News Shipbuilding and Dry-Dock Company which was the lowest bidder for the repair work. Its bid was $8,200,000, and involved an expenditure of $28,000 on its part in making a survey of the liner.

	Base pay 1 to 3 yrs	4 to 6 yrs	7 to 9 yrs	10 to 12 yrs	13 to 15 yrs	16 to 18 yrs	19 to 21 yrs	22 to 24 yrs.	25 to 27 yrs	28 to 30 yrs	Over 30 yrs	Rental allowances: With dependents	Rental allowances: Without dependents	Number of ration allowances	Ration allowances§: With dependents	Ration allowances§: Without dependents (1 ration allowance)
General	$13,500	$13,500	$13,500	$13,500	$13,500	$13,500	$13,500	$13,500	$13,500	$13,500	$13,500	(Allowance fixed by the President)				
Major General	8,500	8,500	8,500	8,500	8,500	8,500	8,500	8,500	8,500	8,500	8,500	$1,440†	$960†		$474.50	$237.25
Brigadier General	6,500	6,500	6,500	6,500	*6,500	6,500	6,500	6,500	6,500	6,500	6,500	1,440†	960†		474.50	237.25
Colonel—																
Over 26 years' service	4,000								5,600	5,800	6,000	1,440†	960†	2	474.50	237.25
First appointment above captain	4,000	4,200	4,400	4,600	4,800	5,000	5,200	5,400	5,600	5,800	6,000	1,440†	960†	2	474.50	237.25
Appointed under Sec. 24, Act June 4, 1920	4,000	4,200	4,400	4,600	4,800	5,000	5,200	5,400	5,600	5,800	6,000	1,440†	960†	2	474.50	237.25
Less than 26 years' service	3,500	3,675	3,850	4,025	4,200	4,375	4,550	4,725	4,900			1,440	960	3	711.75	237.25
Lieutenant Colonel—																
Over 30 years' service	4,000										*5,750	1,440	960	2	474.50	237.25
Over 20 and less than 30 years'	3,500						4,550	4,725	4,900	5,075		1,440	960	3	711.75	237.25
First appointment under second lieutenant	3,500	3,675	3,850	4,025	4,200	4,375	4,550	4,725	4,900	5,075	5,250	1,440	960	3	711.75	237.25
Appointed under Sec. 24, Act June 4, 1920	3,500	3,675	3,850	4,025	4,200	4,375	4,550	4,725	4,900	5,075	5,250	1,440	960	3	711.75	237.25
Less than 20 years'	3,000	3,150	3,300	3,450	3,600	3,750	3,900					1,200	720	3	711.75	237.25
Major—																
Over 23 years' service	3,500							4,725	4,900	5,075	5,250	1,440	960	3	711.75	237.25
Over 14 and less than 23 years'	3,000				3,600	3,750	3,900	4,050				1,200	720	3	711.75	237.25
First appointment above second lieutenant	3,000	3,150	3,300	3,450	3,600	3,750	3,900	4,050	4,200	4,350	4,500	1,200	720	3	711.75	237.25
Appointed under Sec. 24, Act June 4, 1920	3,000	3,150	3,300	3,450	3,600	3,750	3,900	4,050	4,200	4,350	4,500	1,200	720	3	711.75	237.25
Less than 14 years'	2,400	2,520	2,640	2,760	2,880							960	720	2	474.50	237.25
Captain—																
Over 17 years' service	3,000					3,750	3,900	4,050	4,200	4,350	4,500	1,200	720	3	711.75	237.25
Over 7 and less than 17 years'	2,400		2,640	2,760	2,880	3,000						960	720	2	474.50	237.25
First appointment above second lieutenant	2,400	2,520	2,640	2,760	2,880	3,000	3,120	3,240	3,360	3,480	3,600	960	720	2	474.50	237.25
Present rank July 1, 1920 or earlier	2,400	2,520	2,640	2,760	2,880	3,000	3,120	3,240	3,360	3,480	3,600	960	720	2	474.50	237.25
Less than 7 years'	2,000	2,100										720	480	2	474.50	237.25
First Lieutenant—																
Over 10 years' service	2,400			2,760	2,880	3,000	3,120	3,240	3,360	3,480	3,600	960	720	2	474.50	237.25
Over 3 and less than 10 years'	2,000	2,100	2,200									720	480	2	474.50	237.25
First appointment above second lieutenant	2,000	2,100	2,200	2,300	2,400	2,500	2,600	2,700	2,800	2,900	3,000	720	480	2	474.50	237.25
Less than 3 years'	1,500											480	480	1	237.25	237.25
*Second Lieutenant—																
Over 5 years' service	2,000	2,100	2,200	2,300	2,400	2,500	2,600	2,700	2,800	2,900	3,000	480	480	2	474.50	237.25
Less than 5 years' service	1,500	1,575										480	480	1	237.25	237.25

*The maximum pay of a lieutenant colonel shall not exceed $5,750.

†The maximum allowances which will accrue to an officer below the grade of brigadier general, a brigadier general, and a major general will be such as will not exceed $7,200, $9,000, and $9,600, respectively, as pay and allowances combined.

§Ration allowances are computed on the basis of 65 cents per ration. For each 5 cents added to or taken away from the value of the daily allowance, the amounts shown should be increased or diminished by $18.25 for each allowance. For an officer entitled to two rations the difference would be $36.50 and for an officer entitled to three rations the

Since the Board invited tenders for the *Leviathan's* reconstruction, considerable pressure has been brought to bear to have the work performed at the Boston Navy Yard. In justice to the eight private concerns which submitted bids, however, the Administration has felt that it could not in good faith fail to accept the lowest tender.—*Nautical Gazette,* 18 February, 1922.

ICE PATROL RESUMED.—Halifax will again be the headquarters of the U. S. Coast Guard Cutter *Seneca,* which with a sister ship has been detailed to the work of patrolling the Grand Banks and vicinity in accordance with the arrangement made by the International Convention for Safety of Life at Sea adopted at London in 1914.

The *Seneca* and *Androscoggin,* which were on the ice patrol last spring, did very valuable work. They keep in touch with the ice situation, make observations of the quantities of ice, its kind, extent and drift, and obtain all other information of value for the guidance of navigators, together with oceanographical and meteorological observations.—*Nautical Gazette,* 25 February, 1922.

VESSELS SOLD TO FOREIGNERS.—With the consent of the Shipping Board, twenty-one American vessels aggregating 20,696 tons were transferred to foreign flags during the month of January. The largest of these were the following five wooden steamers:

	Gross Tons	Flag
Neabsco	3,353	British
Airlie	2,799	British
Thala	2,799	British
Oneco	2,571	British
Coyote	2,551	French

—*Nautical Gazette,* 18 February, 1922.

LAST FOUR COMBINATION STEAMERS ALLOCATED BY SHIPPING BOARD.—Allocation of the entire fleet of the 535 and 502-feet type combination passenger and cargo steamships built by the Emergency Fleet Corporation has been announced by the Shipping Board. The last four of these models to be completed have been assigned to the Munson and United States Lines. The latter will place the *Lone Star State* and the *Peninsular State* in the North Atlantic service and the *Palmetto State* and *Nutmeg State* will be operated on the New York to Buenos Aires run by the Munson Lines. In addition, the *Buckeye State* and the *Hawkeye State* will be temporarily assigned to the United States Lines for European trade.

Eleven of the fleet are assigned for operation in the Pacific trade and two additional, the *Hawkeye State* and the *Buckeye State,* will be reallocated to it in time for the summer season traffic. Four will be in the South American and six in the European service. The Pacific Mail Steamship Co. is to maintain its San Francisco, India, China, and Japan routes with six ships and the Pacific Steamship Co. has been assigned five for the Seattle to China and Japan service. One of these is the *Pine Tree State,* which holds the speed record of eight days, nineteen hours and thirty minutes between Yokohama and Seattle.

The Munson Lines are operating the *Southern Cross* and *American Legion,* the latter holding the record for the New York to Buenos Aires run, and two more will be put on the same route in March. The two now in operation will then be temporarily withdrawn for the installation of larger fuel tanks. The United States Lines are at the moment entrusted with eight of these combination vessels, four are now on scheduled sailings. The *Buckeye State* and *Hawkeye State* will take the place of two of the larger passenger liners, which will be temporarily withdrawn from service. These two, when returned to the Pacific, will be operated by a new company in a Los Angeles-Hawaiian service.

The *Peninsular State*, one of the new ships assigned to the United States Lines, is undergoing its final trials and is scheduled to sail on February 18. The *Lone Star State*, also allocated to the U. S. Lines, is about ready for service and the two new Munson assignments, the *Palmetto State* and the *Nutmeg State*, will be ready in the course of several weeks. These four are all 535s and are the last of the larger combination passenger and cargo ships on the Fleet Corporation's program to be completed.

Allocation of the entire fleet is shown in the accompanying table:

Operating Company	Name of Vessel	Name of State	Length of Vessel	Service to be Used in
Munson S. S. Co.	*American Legion*	.....	535 feet	N. Y. to Buenos Aires
Munson S. S. Co.	*Southern Cross*	.....	535 feet	N. Y. to Buenos Aires
Munson S. S. Co.	*Palmetto State*	South Carolina	535 feet	N. Y. to Buenos Aires
Munson S. S. Co.	*Nutmeg State*	Connecticut	535 feet	N. Y. to Buenos Aires
Pacific Mail S. S. Co.	*Empire State*	New York	535 feet	San Francisco to Orient
Pacific Mail S. S. Co.	*Hoosier State*	Indiana	535 feet	San Francisco to Orient
Pacific Mail S. S. Co.	*Golden State*	California	535 feet	San Francisco to Orient
Pacific Mail S. S. Co.	*Creole State*	Louisiana	502 feet	San Francisco to Orient
Pacific Mail S. S. Co.	*Granite State*	Vermont	502 feet	San Francisco to Orient
Pacific Mail S. S. Co	*Wolverine State*	Michigan	502 feet	San Francisco to Orient
United States Lines	*Panhandle State*	West Virginia	502 feet	N. Y. to European ports
United States Lines	*Centennial State*	Colorado	502 feet	N Y. to European ports
United States Lines	*Old North State*	North Carolina	502 feet	N. Y. to European ports
United States Lines	*Blue Hen State*	Delaware	502 feet	N. Y. to European ports
United States Lines	*Hawkeye State*	Iowa	535 feet	N. Y. to European ports
*United States Lines	*Buckeye State*	Ohio	535 feet	N. Y. to European ports
*United States Lines	*Lone Star State*	Texas	535 feet	N. Y. to European ports
United States Lines	*Peninsular State*	Florida	535 feet	N. Y. to European ports
Pacific S. S. Co.	*Wenatchee*	.....	535 feet	Seattle to Orient
Pacific S. S. Co.	*Bay State*	Massachusetts	535 feet	Seattle to Orient
Pacific S. S. Co.	*Keystone State*	Pennsylvania	535 feet	Seattle to Orient
Pacific S. S. Co.	*Pine Tree State*	Virginia	535 feet	Seattle to Orient
Pacific S. S. Co.	*Silver State*	Nevada	535 feet	Seattle to Orient

*To be reallocated to new Los Angeles-Hawaiian Line.

—*Nautical Gazette*, 4 February, 1922.

SHIP WORM IN NEW YORK WATERS.—The National Research Council and the Engineering Foundation announce that the dreaded *teredo navalis* or ship worm has gained entrance to New York Harbor waters. It has been found in Barnegat Bay and in other nearby places. This particular borer multiplies with extraordinary rapidity and attacks the under-water portions of wooden piers and wooden ships. Steps are being taken to combat this menace. The usual treatment is with creosote or corrosive sublimate.—*Nautical Gazette*, 25 February, 1922.

WORLD'S ONLY SIX-MASTERS.—The only six-masted sailing vessels now afloat are the American schooners *Ruth E. Merrill, Edward J. Lawerence*, and *Wyoming*. Though at one time there were nearly a dozen six-masted American schooners in the coastwise coal trade, they came to various untimely ends, and none have been built in several years. The only seven-masted vessel ever constructed, the *Thomas W. Lawson*, was wrecked a number of years ago on the Irish coast.

The largest of the vessels yet in service is the *Wyoming*.. She is of 3,730 gross tons and can carry more than 6,000 tons of coal, her cargo capacity being greater than that of many steamers. Built in 1909 at Bath Me., the home of schooners, the *Wyoming* has had a peculiar history. In the first five years of her life, when she was employed in the coastwise coal trade, she paid for herself. Her cost was about $160,000. Then, at the beginning of the war she was sold to the France and Canada Steamship Corporation, the price received being in the neighborhood of $400,000. In the last three years schooner prices dropped like a shot and she was acquired, not long ago, by Captain Griffin, her present master, and associates for $36,000.

The *Wyoming* was purchased by the syndicate from the France and Canada Steamship Corporation, together with four other vessels, all well-known craft, for the sum of $115,000. The other schooners are the *Cora Cressy, Edward J. Lawrence, Dorothy Palmer* and *Oakley C. Curtis.* It is believed that the former owners paid nearly $2,000,000 for the five ships during the war.—*Nautical Gazette,* 11 February, 1921.

AERONAUTICS

THIRTY-FOUR KILLED IN CRASH OF THE ROMA.—Thirty-four officers, enlisted men and civilians were killed on February 21 when the Army dirigible airship *Roma* plunged a thousand feet and crashed to earth in flames near the Hampton Roads army base. Only eleven of the forty-five men aloft with her were saved, and some of them were terribly hurt. Three were slightly injured.

The breaking of the rudder with its vertical controls, affixed in box-kite fashion to the stern, is believed the original cause of the disaster. Just as the craft plummeted into the earth the metal-clad nose struck high-tension electric power wires, and the dirigible was fired from stem to stern.

Only those whose fortunate positions in the car enabled them to leap before the flames ran with lightning speed through the gas bag, had the faintest chance for their lives. The thirty-three who couldn't jump died. One officer broke his neck in a dive to earth and was dead before he could be got to a hospital.

Many Officers Among Dead

The crushed, misshapen mass that thudded onto the field was a funeral pyre of such intense heat that the agonies of those who were not killed in the crash must have been mercifully brief. The bodies were burned beyond recognition and the slow work of listing the victims was carried out partly by a process of elimination and partly through non-combustible objects that the aviators had carried in their pockets. That list when it was completed showed that two majors, four captains, and seven lieutenants were among the lost.

The *Roma's* gas bag, with its cubical capacity of 1,100,000 feet, was filled with hydrogen. Non-inflammable helium was the leviating gas used when the *Roma,* which was bought from the Italian Government, went on her first trial flight last December. But it had been planned to send the ship—the largest semi-rigid airship in the world—on a spring cruise over the country to demonstrate her fitness to cross the Atlantic. In her bag had been the whole available supply of helium in the United States. Flying officials wanted that for the spring journey, so they pumped it into tanks and substituted hydrogen.

Trip to Test Liberty Motors

The occasion for the fatal flight was a desire to test the Liberty Motors which had been installed to replace the Italian motors.

In charge of Captain Dale Mabry, with a full complement of officers and men and a few civilian guests, the huge craft went aloft from Langley Field at 1:30 o'clock in the afternoon. It was just forty-nine minutes later that she lay in ruins, with most of those who had gone up in gay holiday mood dead in the wreckage.

The whole story was compressed into the last minute or so. In that time Captain Mabry and Lieut. Byrum G. Burt, at the control wheels, had striven with every resource of courage and skill to guide the wobbling airship to a safe landing. Others trained for swift action in just such pinched seconds had played their part by hurling overboard bag

after bag of sand ballast. An instant later the falling airship came into contact with the electric wires, charged with 2,300 volts, that supply current to the army base, and the explosion and fire followed.

Lieutenant W. E. Riley, a member of the official crew, jumped from a window of the cabin when the explosion came. His parachute failed to work properly and he struck the street pavement on his head. His neck was broken and he died before reaching the hospital.

There was just one man who leaped and landed on soft ground. He escaped almost unhurt with the exception of a few burns on his face and hands. He is Lieutenant Byrum G. Burt. He jumped from the *Roma* when she was about thirty feet in the air. He landed in the mud on the shore of Hampton Roads.

Captain Walter G. Reed, who stood by the ship to the last and did all he could to help others, came out of the burning mass of steel and wood and rags with just a few scars on his ears and hands. He says he does not know why he is alive. Of all the line officers on the *Roma* only two escaped death—Captain Reed and Lieutenant Burt.

Falls Across Railroad Track

The airship fell directly across a railroad track, the elevator and rudder falling on and remaining suspended from a telegraph pole. At one side of the track was a stack of steel parts of railway cars, on the other was a big heap of pigiron. It was into the pile of iron scraps that the passenger car of the dirigible smashed.

Rescuers from the Army Supply Depot rushed to the scene, and many daring attempts were made to penetrate the smoke and gas to rescue those in the ship. It was several hours before the car of the airship could be reached, and then only after army, navy, and civilian fire-fighting forces had quenched the flames. The rescue work was also delayed until huge army derricks were brought to the scene to lift the steel wreckage from the car.

Major General Mason M. Patrick, Chief of Air Service, who flew to the scene of the disaster a few hours after it occurred, sent the following telegram to the Adjutant General on February 22:

"Have ordered thorough investigation to determine cause of *Roma* disaster. Information already gathered indicates that cable to elevating rudders broke. Ship nosed down. Struck live wires carrying high tension electric current and this started fire. There was no explosion and no fire until after those wires were hit and broken.

"PATRICK."

General Patrick also reported orally that the accident to the elevating rudders of the *Roma* occurred at an elevation of only 600 feet.

Crew of Picked Men

The *Roma's* crew was picked from the men stationed at Langley Field. They were said to be among the best airmen at the big army post. Each man was assigned to certain duties, and each man was an expert at the duties assigned to him.

It is the opinion of all survivors, as well as of observers of the disaster, that the officers in charge of the craft, the operating crew, and others aboard acted most admirably and coolly under the harrowing circumstances. They are declared to have stuck to their posts as long as it was possible to do anything with the ship, a number dying at their posts of duty.

In the flight, on what was to have been a speed trial with her four Liberty motors, each of 400 horsepower, the *Roma* was to have tried to maintain a speed of 100 miles an hour. It was the first time up with the

new motors, and the first time she had ever attempted to make any unusual speed.

The *Roma* had not been out of her hangar at Langley Field for several weeks.—*Army and Navy Journal*, 25 February, 1922.

THE CURTISS TWIN-ENGINED TORPEDO SEAPLANE.—The Curtiss Aeroplane & Motor Corporation of Garden City, L. I., has recently turned over to the Navy Department a very interesting torpedo seaplane known as the *Curtiss CT* (Curtiss Torpedoplane). This is one of the most advanced designs yet produced in the country and shows that American military airplane design is able to keep pace with that of any other country in the world; in fact this machine would appear to be without a rival as far as excellence of design is concerned.

The machine is a cantilever monoplane with the engine mounted practically in the wings. The engines are Curtiss CD12's and drive tractor propellers. The cooling is by two Lamblin radiators mounted under the engine nacelles under the wing. The fuel tanks are in the wings between the engine nacelles and the central nacelle. The engine instruments are mounted on the side of the nacelle in plain view of the pilot; in fact they are only about 3 feet from his head and on a level with it.

The entire machine, except for the wing covering, is built of wood. The wings are covered with fabric and taper both in chord and camber from the root to the tip. They have a span of 65 feet. The maximum thickness of the wings is 30 inches and the chord at the root 16 feet, which gives a maximum wing depth of 15.6 per cent. It is expected that future models will be constructed of metal and will be somewhat lighter.

The undercarriage consists of two floats, one under each engine. This arrangement obviates the need of wing tip floats and the main floats are sufficiently long to allow the designer to dispense with any tail floats also. The empennage is supported on booms, one of a pair running from the rear end of the float and the other from the rear of the engine nacelle, the pairs being parallel. There are four booms altogether. There are two vertical fins and two balanced rudders. The method of rudder control is very interesting. There is only one control horn on each rudder; these horns are in the space between the rudders. The tips of the balanced portions are connected together by a wire. Thus a pull on one control horn is transmitted through the rudder to the balance wire and by that means to the other rudder. The rudders are located directly behind the propellers and hence are in the slipstream, which arrangement makes for excellent control.

This machine has a high speed of 112 m.p.h. With only one engine running it loses only about 100 feet per minute. It is expected that with metal construction the machine will be able to fly level on one engine. The useful load is about 3,800 pounds consisting of fuel and oil, crew, and a standard torpedo or bomb load. The crew consists of a gunner, pilot, and assistant pilot. The pilot also acts as the bomber.

There are several very ingenious gadgets on this machine. Among these may be mentioned the stands for the mechanics to work on the engines from. These are shelves that pull in and out of the wing on each side of the engines. Handgrips on the sides of the central nacelle and steps on the undercarriage struts provide easy access and exit.—*Aviation*, 6 February, 1922.

AIR STRENGTH OF THE GREAT POWERS

Tables Prepared by Sub-Committee on Aircraft of Washington Conference Give Authorized and Actual Air Strength Data for United States, France, Great Britain, Italy, and Japan

AUTHORIZED STRENGTHS

Heavier-Than-Air

Active and Immediate Reserve Aircraft—Service Type

Types of Planes

Classification of Units in Which Aircraft or Personnel Are Maintained	CHASSE (Pursuit or Combat)					ATTACK, DAY					BOMBING OR TORPEDO NIGHT					OBSERVATION (Spotting, Photographing, Artillery Control Infantry Contact Patrol)					Long Distance Observation or Scouting				
	United States	Great Britain	France	Italy	Japan	United States	Great Britain	France	Italy	Japan	United States	Great Britain	France	Italy	Japan	United States	Great Britain	France	Italy	Japan	United States	Great Britain	France	Italy	Japan
Full Strength Home	164	45	445	448	144	146	63	172	47	16	64	—	210	38	—	75	78	454	287	400	—	51	—	72	—
Squadrons Abroad	*A 64	48	—	—	—	*A 48	184	234	—	—	*A —	40	—	4	—	*A 39	168	524	36	—	*A —	46	—	—	—
	*B					*B					*B					*B					*B				
Cadre or Other Part Strength Squadrons Home	10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	114	—	—	—	—	14	—	—	—	—
Abroad	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	12	—	—	—	—	2	—	—	—	—
Headquarters, Schools Training Establishments Home	138	24	28	188	196	124	104	10	22	25	16	18	18	19	45	187	140	36	79	275	12	41	—	42	—
Abroad	—	—	—	—	—	—	—	9	8	—	—	—	—	—	—	—	18	24	—	—	—	—	—	—	—
Other State Owned Organizations Home	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Abroad	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
TOTALS Home	312	69	473	636	340	270	167	182	69	41	80	18	228	57	45	376	218	490	366	675	26	92	—	114	—
Abroad	64	48	—	—	—	48	193	242	—	—	—	40	—	4	—	51	186	548	36	—	2	46	—	—	Totals
United States	376	—	—	—	—	318	—	—	—	—	80	—	—	—	—	427	—	—	—	—	28	—	—	—	-1229
Great Britain	—	117	—	—	—	—	360	—	—	—	—	58	—	—	—	—	404	—	—	—	—	138	—	—	-1077
France	—	—	473	—	—	—	—	424	—	—	—	—	228	—	—	—	—	1038	—	—	—	—	—	—	-2163
Italy	—	—	—	636	—	—	—	—	69	—	—	—	—	61	—	—	—	—	402	—	—	—	—	114	-1288
Japan	—	—	—	—	340	—	—	—	—	41	—	—	—	—	45	—	—	—	—	675	—	—	—	—	-1101
GRAND TOTAL																									6858

Japan.....

Active Personnel

	PILOTS														
	Officers					N. C. O.					Enlisted				
	United States	Great Britain	France	Italy	Japan	United States	Great Britain	France	Italy	Japan	United States	Great Britain	France	Italy	Japan
Home.....	1904	——	25800	*1 950	500	80	—	—	—	—	14856	—	—	8000	4488
Abroad.....	369	——	6500	*1 30	—	0	—	—	—	—	2306	—	—	440	—
Total.....	2273	*C 30,880	32,300	980	500	80	—	—	—	—	17,162	—	—	8440	4488

*A. Although the totals are correct, the numbers shown in each column are only approximate, as many of the airplanes employed by the Royal Air Force could be classified under more than one heading.

*B. The authorised strength of these units varies according to the immediate requirements of the service. The actual strength has therefore been given.

*C. This figure represents the maximum number of personnel up to which the Royal Air Force is authorised to mobilize without Parliamentary legislation.

*D. There is no period of service stipulated for officers of the Royal Air Force, with the exception of a small percentage who serve on short service commissions for four years. N.C.O.s and men serve for varying periods, which range from five years with the colors and three on the reserve, to twelve years with the colors.

*1. Approximately two thirds of pilots are officers.

*2. The pilots are breveted mostly in civilian schools and enlist from them into the squadrons.

Duration of Serivce

		Pilots		
COUNTRY	Method of Enlisting	Officers	N. C. O.	Non-flying Personnel
United States....	Voluntary	Permanent	1 to 4 years	1 to 4 years
Great Britain....	Voluntary	*D	*D	*D
France.....	Conscription	2 years	2 years	*2 2 years
Italy.....	Voluntary and Compulsory	NOT DEFINITE		8 months and more
Japan.....	Voluntary and Compulsory	No definite duration	More than 1 year	More than 1 year

"Home" for United States includes: The forty-eight States and one territory within the continental limits of North America.
"Abroad" for United States includes: Alaska, Hawaiian Islands, Philippines, Guam, Haiti, San Domingo, Panama Canal Zone, St. Thomas, etc.
"Home" for Great Britain includes: British Isles and Ireland.
"Abroad" for Great Britain includes: India, Mesopotamia, Egypt and Mediterranean.

Lighter-Than-Air

Active and Immediate Reserve Aircraft

	RIGIDS					SEMI AND NON-RIGIDS					BALLOONS				
	United States	Great Britain	France	Italy	Japan	United States	Great Britain	France	Italy	Japan	United States	Great Britain	France	Italy	Japan
Active.....	1*a	—	1	*b	—	9	—	12	2*b	3	AS	—	23	10	7
Reserve.....	—	—	1			—	—	3	—	1	RE-	—	60	4	3
Total.....	1	—	2			—	9	—	15	2	4	QUIRED	83	14	10

*a Not yet built.
*b Not fixed whether rigid or semi-rigid.

Active Personnel

	OFFICERS					N.C.O.					ENLISTED				
	United States	Great Britain	France	Italy	Japan	United States	Great Britain	France	Italy	Japan	United States	Great Britain	France	Italy	Japan
Home.....	207	—	3700	—	28	20	—	—	—	406	2912	—	—	—	—
Abroad.....	49	—	500	—	—	0	—	—	—	—	600	—	—	—	—
Total.....	256	—	4200	—	28	20	—	—	—	406	3512	—	-	—	—

ACTUAL STRENGTH ON OCTOBER 1, 1921

Heavier-Than-Air

Active and Immediate Reserve Aircraft—Service Types

TYPES OF PLANES

Classification of Units in which Aircraft or Personnel are Maintained	CHASSE (Pursuit or Combat)					ATTACK, BOMBING OR TORPEDO DAY					ATTACK, BOMBING OR TORPEDO NIGHT					OBSERVATION (Spotting, Photographing, Artillery, Control, Infantry, Contact Patrol)					Long Distance Observation or Scouting				
	United States	Great Britain	France	Italy	Japan	United States	Great Britain	France	Italy	Japan	United States	Great Britain	France	Italy	Japan	United States	Great Britain	France	Italy	Japan	United States	Great Britain	France	Italy	Japan
Full Strength Squadrons Home	29	*A 45	282	170	63	32	*A 52	111	19	—	—	*A —	150	20	—	35	*A 69	325	130	132	—	*A 52	—	40	—
Abroad	36	*A 48	—	—	—	—	*A 184	232	—	—	—	*A 30	—	4	—	39	167	522	36	—	—	**A 47	—	—	—
Cadre or Other Part-Strength Squadrons Home	48	—	—	—	—	—	—	—	—	—	—	—	—	—	—	90	—	—	—	—	17	—	—	—	—
Abroad	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	12	—	—	—	—	5	—	—	—	—
Headquarters, Schools Training Establishments Home	7	*B 24	*2 21	37	132	56	*B 104	*2 7	6	18	18	*B 18	*2 13	4	30	97	*B 140	*2 27	30	162	9	*B 41	*2 —	8	—
Abroad	—	—	—	—	—	—	9	8	—	—	—	—	—	—	—	7	18	24	—	—	—	—	—	—	—
Other State Owned Organizations Home	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Abroad	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
TOTALS Home	84	69	303	207	195	88	156	118	25	18	18	18	163	24	30	222	209	352	150	294	26	93	—	48	—
Abroad	36	48	—	—	—	—	193	240	—	—	—	30	—	4	—	58	185	546	36	—	5	47	—	—	TOTALS
United States	120	—	—	—	—	88	—	—	—	—	18	—	—	—	—	280	—	—	—	—	31	—	—	—	— 537
Great Britain	—	117	—	—	—	—	349	—	—	—	—	48	—	—	—	—	394	—	—	—	—	140	—	—	— 1048
France	—	—	303	—	—	—	—	358	—	—	—	—	163	—	—	—	—	898	—	—	—	—	—	—	— 1722
Italy	—	—	—	207	—	—	—	—	25	—	—	—	—	28	—	—	—	—	186	—	—	—	—	48	— 494
Japan	—	—	—	—	195	—	—	—	—	18	—	—	—	—	30	—	—	—	—	294	—	—	—	—	— 537
																								GRAND TOTAL	4338

Active Personnel

	Officers					PILOTS					N.C.O.					Enlisted				
	United States	Great Britain	France	Italy	Japan	United States	Great Britain	France	Italy	Japan	United States	Great Britain	France	Italy	Japan	United States	Great Britain	France	Italy	Japan
Home....	928	1734	21,900	450	275	78	—	—	—	—	9530	20,254	—	5525	250					
Abroad...	115	651	6,500	30	—	3	—	—	—	—	1870	6,331	—	325	—					
Total.....	1043	2385	28,400	480	275	81	—	—	—	—	11,400	26,585	—	5850	250					

*A *B *D (See Heavier-than-air).
*2 (See Heavier-than-air).

Duration of Service

COUNTRY	Method of Enlistg	Pilots: Officers	Pilots: N. C. O.	Pilots: Non-flying Personnel
United States....	Voluntary	Permanent	1 to 4 years	1 to 4 years
Great Britain....				
France.....	Conscription	2 years	2 years	2 years
Italy.....	Voluntary and Compulsory	PERMANENT		More than 8 months
Japan.....	Voluntary and Compulsory	No definite duration	More than 1 year	More than 1 year

—*Aviation*, 6 February, 1922.

THE VACUUM AIRSHIP.—Although the airship in this country is for the time being virtually dead, activity in connection with it is still being displayed in several foreign quarters. There are, of course, some here who even yet have not abandoned their faith in its future, but it cannot be denied that very little impetus now remains in this country behind the development of airships. They have been virtually discarded for naval and military purposes; those which we own have been the subjects of frequent mishaps, culminating in the lamentable disaster to *R-38*, and all efforts on the part of the Government to induce anyone to take over and operate the existing fleet on a commercial basis have failed. Abroad the discouraging factors have apparently been less acute or less acutely felt. Certain it is that here and there people are to be found who are laboring undauntedly to improve the design and construction of airships. In the United States, for example, full-sized experiments are being conducted by the Navy Department on the use of helium or a helium mixture as a substitute for hydrogen. But of all the efforts now being made none exceeds in scientific interest and fundamental significance those in connection with the Vaugean airship at present in course of construction at Milan. This vessel, of which a description was published recently in *Le Génie Civil*, does not derive its buoyancy either from hydrogen or helium. Instead, M. Vaugean seeks to secure flotation by exhausting the air from a metal sheathed envelope. Such a proposal is, of course, far from being new. Indeed, the use of rarified air as represented by Montgolfier's fire balloon of 1783 actually takes precedence of hydrogen or coal gas in point of time. It has, too, so far failed to yield practical results of any importance, and in modern times has been shown mathematically to be impossible of application to airships of the self-propelled type. M. Vaugean holds, however, that the mathematicians' conclusions are premature, and that recent metallurgical discoveries combined with the adoption of certain principles of construction and working which he has devised, bring the proposal inside the reach of practical attainment.

The rock on which the vacuous balloon or airship has hitherto foundered is the difficulty or impossibility of constructing the envelope of sufficient size to give the required lift and of sufficient strength to resist the air pressure. A cubic foot of air weighs just over fourteen times as much as a cubic foot of hydrogen at the same temperature and pressure. It therefore follows that a given volume filled with hydrogen at atmospheric pressure is equivalent in lift to the same volume exhausted of air to a pressure very slightly in excess of one pound per square inch absolute. The outer skin of the equivalent vacuous airship or balloon is thus exposed at the ground level to a resultant pressure of 13.7 pounds per square inch, a figure small, of course, when contrasted with the pressure inside a boiler or outside a tube, but of prohibitive magnitude when applied to the exterior of a vessel of the size and construction of an airship or balloon. The essential characteristic of M. Vaugean's scheme is that he does not propose to employ such a degree of rarefaction *at the ground level*. He designs his airship to travel, let us say, at an altitude of 10,000 feet. At that height the atmospheric pressure is about 10 pounds, so that with an internal vacuum of 1 pound absolute the envelope will be subjected to a resultant pressure of 9 pounds per square inch, a value which, he believes, he can design it to withstand. To descend he increases the internal pressure in such a way that when the ground level is reached it amounts to 5.7 pounds—that is to say, in such a way that the resultant pressure on the exterior of the envelope remains constant at 9 pounds throughout the descent. It is to be noted that were the internal pressure not increased and were the vessel pulled down to the ground level by means of ropes, it would arrive at the surface with

a considerable amount of surplus lift. By increasing the internal pressure in the manner stated the lift remains constantly equal to the weight of the structure throughout the descent. Such, in brief, is the essence of M. Vaugean's scheme. As for practical details, it will perhaps be sufficient to say that it is proposed to use aluminum-copper-manganese alloys for the structure and sheathing of the envelope, to maintain and vary the internal vacuum by means of pumps assisted by the heat of the exhaust from the engines, and to carry the vacuum in three or more concentric chambers, each, passing inwards, containing a higher degree of rarefaction than the next outer one. By the judicious choice of the temperatures at which the contents of the three concentric chambers are preserved M. Vaugean estimates that it will be possible to operate the vessel with an effective pressure of only 2.1 pounds per square inch on the outer skin, 3.5 pounds on the intermediate, and 4.5 pounds on the inner.

The scheme is doubtlessly open to criticism at several points. For instance, it appears certain that it is bound to result in an increase in the dimensions of an airship designed to give a specified lift. That such will be the case can readily be shown for the vacuous airship without concentric chambers. Taking the internal pressure at the ground level at the value previously mentioned—namely, 5.7 pounds—a simple calculation shows that to develop the same lift as a hydrogen airship the vacuous vessel would have to be 1.55 times as great. Such a magnification of the dimensions of a type of vessel already objectionably large cannot be regarded with approval, but it is not of itself a fatal disadvantage. From the practical rather than the theoretical point of view criticism of the scheme will no doubt be chiefly directed towards the difficulty of creating and maintaining a high degree of vacuum in a vessel the capacity of which may be anything from one to three million cubic feet. The effort required to maintain a good vacuum in a condenser is well known, but the two cases are, we think, hardly comparable, although we feel certain that this question of maintaining the vacuum will be quite the most difficult that M. Vaugean will have to face. It should be remembered, however, that by carrying the vacuum in three or more concentric chambers differentially exhausted, not only is the crushing stress reduced, but the tendency to lose the vacuum by leakage is favorably modified. In addition, the arrangement will no doubt help the vessel in the matter of the size of the exhausting plant to be carried on board, for operational changes of the internal pressure would no doubt be effected in but one of the chambers, leaving the others under the pre-arranged vacuum. The whole scheme is very highly interesting. It may not be completely practicable at the present moment, but it might well become so with a little experience or, at the worst, as a result of some apparently small advance in metallurgy or in some other direction. It is at any rate worthy of scientific attention, for if it is or becomes practicable it will do very much more for the airship than would the discovery of a cheap, plentiful, and handy source of helium or other light non-inflammable gas.—*The Engineer*, 20 January, 1922.

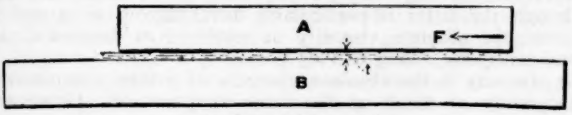
ENGINEERING

LUBRICATION—ABSOLUTE VISCOSITY OF OIL.—Everyone knows that some oils will flow out of a can more quickly than others, and that when rubbed between two fingers there is a difference in the feel—one oil will rub out more quickly than another. This difference in the action of lubricants is controlled by a basic physical property called viscosity.

Force is always required to change the shape of any body, on account of the resistance of its molecules to a change in position. In the case of the oil flowing out of the can, the force is that of gravity; when rubbing

the oil between the fingers, the force is the pressure applied by the fingers. Oils that have the greatest internal resistance are moved by gravity the most slowly; in other words, they flow out of the can less quickly.

This resistance of a fluid to a change in its shape is called viscosity. It is the inverse of fluidity. It is the property of the oil which enables it to hold two bearing surfaces apart, thereby preventing metallic contact and wear. Evidently, it is an important thing to know about an oil.



Frictional Resistance

There are, in common use, a number of units of viscosity, which should be thoroughly understood, the principal terms by which they are known being absolute viscosity, fluidity, specific viscosity, kinematic viscosity, Saybolt viscosity, Redwood viscosity, furol viscosity, Engler viscosity, and other units.

In the sketch a plate A is supported parallel to the plate B by the oil film of t thickness. In order to move the upper plate, a certain force F will be required to overcome the resistance of the oil film. The amount of this force F will be determined by the rate at which the plate is moved and the shearing resistance of the oil film. The faster it moves the greater will be the force required. If the velocity is kept constant and the thickness reduced, it will require more force to maintain the same velocity on account of the increased rate of shear of the thinner film. Obviously, also, the total force required varies directly with the area of the upper plate. Reducing all these facts to the form of a formula, we find that

$$Force = \frac{shearing\ resistence \times area \times velocity}{film\ thickness}$$

Since the shearing resistance is known as the *viscosity*, our formula becomes

$$Force = \frac{viscosity \times area \times velocity}{film\ thickness}$$

Under the conditions of a plate having a surface area of one square centimeter and a film thickness of one centimeter, when a force of one dyne is required to maintain a velocity of one centimeter per second, the fluid is said to have a viscosity of one *poise*. This unit, the poise, is the unit of absolute viscosity.

The force required to overcome the frictional resistance between any two moving surfaces separated by a film of lubricant may be calculated from the general formula,

$$F = \frac{\mu a v}{t}$$

When metric absolute units of measurement are used, F will be the force in dynes, μ the absolute viscosity in poises, a the area in square centimeters, v the relative velocity in centimeters per second, and t the distance between the two surfaces in centimeters. When the English units of pounds force, square inches area, feet per second velocity, and inches thickness are used, the viscosity of course being measured in poises, as there is no English unit of viscosity, the formula becomes

$$F = \frac{\mu\ a\ v}{5737\ t}.$$

Fluidity is the inverse of absolute viscosity. An oil of an absolute viscosity of 0.25 poise will have a fluidity of 4. Oils of low viscosities have high fluidities, and very viscous oils have low fluidities.

The poise is a comparatively large unit, and as many oils at their working temperatures have a viscosity of less than one poise, another unit, the centipoise, has been brought into common use. The centipoise is one hundredth of the poise. An oil of an absolute viscosity of 0.25 poise has an absolute viscosity of 25 centipoises. Both terms are frequently used, although the latter is particularly advantageous as a unit of comparison, since the absolute viscosity of water at 20 degrees C. is almost exactly one centipoise, being 0.01005 poises.

Specific viscosity is the absolute viscosity of a fluid compared with the absolute viscosity of water at the same temperature. However, as the viscosity of water also changes with the temperature, common practice is to refer to the viscosity of water at 20 degrees C., at which temperature the absolute viscosity is 1.005 centipoises. On this account specific viscosity is a very convenient unit to use in visualizing the absolute viscosity of an oil, because everyone has a fairly good idea of the fluidity of water at 20 degrees C. (68 degrees F.). For instance, if we say the specific viscosity of an oil is 25, we know that it is twenty-five times as viscous as water at 20 degrees C., and will have twenty-five times the frictional resistance that the water has at that temperature.

Absolute viscosities are difficult to measure directly, except with the torsion viscosimeter, and on this account various instruments have been devised to measure units that have a relation to the absolute viscosity. These units are suitable for comparison within certain narrow limits and, if properly corrected for their variations, can be used to calculate the absolute viscosity of an oil. The principal trouble with the familiar viscosity units is that there is no constant multiplier or correction factor, nor do any of the various units have any direct relation between each other. Carefully worked out curves of calibration and conversion are usually necessary in order to obtain these relations.—*Power*, 28 February, 1921.

TEST OF STILL ENGINE.—The first large Still combined steam and oil engine was recently tested out by Scott's Shipbuilding Company. A higher thermal efficiency was obtained than that achieved by any other type of prime mover, as the fuel consumption proved to be only 0.375 pounds per b.h.p. hour at full load. This is equivalent to a brake thermal efficiency of 37.7 per cent.—*Nautical Gazette*, 18 February, 1922.

NEW MARINE PROPULSION GEAR.—In a paper read before the Institution of Engineers and Shipbuilders in Scotland, Mr. W. Ross Darling described a form of gear which he proposes for marine propulsion. The place of the teeth on the pinion is taken by a bundle of loose wire rollers which are free to move and adapt themselves to the form of the teeth on the gear wheel.

The pinions in use so far have proven entirely successful. They can be moved into gear instantaneously or gradually while revolving at any speed. This is done regularly at present at a speed of 2,000 revolutions per minute without shock or danger of any kind.—*Nautical Gazette*, 11 February, 1922.

SAND BLASTING APPARATUS FOR CLEANING BOILERS.—A new method of clearing boilers from scale and soot by means of sand blasting with compressed air has been introduced into the marine field by the Badische Maschinenfabrik of Durlach, Germany. This method has been already successfully applied to stationary boilers of the watertube and cylindrical

type, but its adaptability to boilers on board ships has only recently been demonstrated.

The apparatus consists of an air blower suitable for blasting sand through lances by means of a special kind of nozzle. The cleaned surfaces become so polished by the sand that they are given a metallic shine without damage to the boiler. The system may be applied to any kind of boiler provided with openings for introducing steam or air lances. In its operation the blower requires an air pressure of from 15 to 28 pounds per square inch and about 4,000 feet of non-compressed air per hour, during which time it will remove from 40 to 60 square feet of scale, while its performance in the removal of soot is much greater.

This method of cleaning boilers possesses several advantages over other systems. It works much faster, is more effective and more econonomical, and both the inside and outside of the boiler tubes can be cleaned. One of the main advantages of the system is the improvement in the heat economy of the boilers as a result of its use; the tubes of the boiler are cleaned so thoroughly that the heat is transferred more effectively than it would be if other systems of cleaning were used which inevitably leave a coating of scale and soot in and around the tubes.—*Nautical Gazette,* 18 February, 1922.

DIESEL ENGINES FOR AIRCRAFT.—Reports are in currency to the effect that research work which has been in progress at the Royal Aircraft Establishment at Farnborough is likely to lead to the development at an early date of a practical engine for aeroplanes which would be operated on the Diesel principle. It is said that in Germany a six-cylinder engine of this type for aircraft has been designed and built, and that French engineers are on the eve of achieving a similiar success. From the point of view of aircraft operation the elimination of the magneto and carbureter and the possibility of using heavy oil with a high flash point is much more important than in other applications of engines designed on what, to the injustice of British workers, is commonly known as the Diesel principle. The reduction of the fire risk and the ability to use cheaper fuels than those now employed are most important considerations. —*The Engineer,* 27 January, 1922.

ELECTROLYTIC PROTECTION OF BOILERS.—According to W. Phillippi, in the October, 1921, issue of *Siemens Zeitschrift,* a successful method has been found to protect steam boilers against their two greatest enemies, corrosion and boiler scale. Careful investigations of corrosion on boiler bottoms, water tubes and condensers have proved that electrolytic action was the cause of these damages. Owing to the electromotive forces set up in the different metals used in the construction of boilers, condensers, etc., in connection with conducting water, currents circulated from these metals through the water and caused corrosion. But it was also found that in many cases stray currents from electric railways or from other poorly insulated electrical systems entered the boilers and caused corrosion.

A remedy suggested itself by employing a metal of higher voltage, like zinc, and connecting it electrically to the endangered boiler, to create a counter-voltage that would prevent the flow of the corrosive current. But this method did not always give complete satisfaction, as it was impossible to regulate the current, which is necessary for different conductivity of water used.

To use an externally generated direct current and to apply this through electrodes in the boiler, was found to be a remedy under all conditions. If this is done, the small but constant generation of hydrogen along the boiler walls will also prevent the formation of boiler

scale. A direct voltage of from 10 to 20 volts, at a current density of about two milliamperes per square foot boiler inner surface, was found to be most effective. A small resistance in series with each electrode circuit permits of suitable regulation of the current. Ordinary wrought-iron pipes are used as electrodes. Experience with this protection, extending over a period of several years, surpassed all expectations. On boats using sea water in the condensers, no corrosion of any kind was observed after months of operation, while it was necessary before installing the electrolytic protection to clean them every few weeks.—*Power*, 7 February, 1922.

NAVIGATION AND RADIO

BRITISH CHARTS SUPREME.—Admiral Chandler, U. S. N., has paid a high tribute to the hydrographical work of the British Navy. This officer, who is the head of the Hydrographic Office of the American Navy, is quoted by *Lloyd's List* as stating that, according to the records of his department, there are 1,200 points on the globe to which ships of the U. S. Navy, as well as the merchant marine, necessarily navigate on British Admiralty charts, if navigation is to be accomplished at all. This means, says the *New York Commercial*, that the United States, though aspiring to a navy equal to any, and a merchant marine surpassing all has failed to chart the seas on its own behalf in about one third of the navigable globe. The omission of Congress to vote adequate appropriations is held responsible for this state of affairs. American battleships and merchantmen sailing in eastern Atlantic waters and along the west coast of Europe have to employ 712 different charts, of which number 539, or 75 per cent of the whole, are British Admiralty charts, made available during the recent war, in which the United States was associated with this country.

In his last appearance before Congress, Admiral Chandler told members of the Appropriations Committee that, granted sufficient funds, the United States might become independent of British charts within five years; but at the present rate, he added, such independence would never be reached. Of the 310 charts necessary for navigation round Australia and the East Indian Islands, 237, or 46 per cent, were available to American ships only through the courtesy of the British Admiralty. With the United States involved in a war which precluded the British Empire from lending such aid, an American battleship would have to await the completion of a chart if its duties called it to one of the many areas not yet charted by the U. S. Navy. Quite apart from the naval aspect of the of the hydrographical situation, continues the New York paper, which has its picture of American warships compelled, for lack of navigation charts, to await a month or two before giving battle, the development of the American merchant marine has resulted in most profitable activities for the British Admiralty chart agents in America. In addition to the large sums of money which the U. S. Navy has to spend each year on these charts, profits are pouring into the British Admiralty from the sale of similar charts to American shipping, 37 per cent of which goes regularly into European waters where Admiralty charts are the only ones to be depended on.—*Naval and Military Record*, 8 February, 1922.

NEW AEROPLANE COMPASS.—A satisfactory type of aeroplane compass has been invented by Doctors Paul R. Heyl and Lyman J. Briggs of the Bureau of Standards, of the Department of Commerce. Flying tests with this instrument have been made, and the air service is now engaged in putting a number of models into service.

The instrument weighs only 13 pounds, while the weight limit set by the air service was 25 pounds.

The new compass depends for its action not on a magnetic needle, but upon a revolving coiled wire. This principle is by no means new, but it has remained for the Bureau of Standards to apply it in such a way as to make the device practically operative under the very severe conditions prevailing in actual flight or aeroplane stunts.

The problem of perfecting a satisfactory aircraft compass was given the Bureau of Standards about a year ago. At the end of the war no completely satisfactory compass had been devised. Its importance to aviation is apparent when it is remembered that no aeroplane compass heretofore perfected has been able to keep up with the evolutions of a plane. Whenever the plane turned rapidly, or was stunted, compasses were not reliable. The result was that many pilots lost their lives by losing all idea of direction. Several of the air mail pilots have been killed because of the lack of a satisfactory compass. One of them crashed at full speed into a mountain in Pennsylvania.—*Aerial Age Weekly*, 13 February, 1922.

NEW ROTARY BRAKE SOUNDING MACHINE.—One of the latest developments in electrically driven appliances for marine service is the Lietz rotary brake sounding machine, which consists of a mechanical sounding device driven by a General Electric one-horsepower motor. By means of this apparatus soundings may be taken up to 100 fathoms without decreasing the speed of the vessel or incurring the risk of losing the lead or wire.

The outstanding feature of the machine, which is an improved type of a former design, is the brake action, which has been much simplified. The brake mechanism is of a new design, and consists of a mounted shaft having a hollow portion on which the reel revolves. The brake clutch is rigidly mounted and is operated through the hollow portion of the shaft by means of a screw. The screw, engaging with the rolling members in the hollow portion of the shaft, causes expansion and contraction of the brake clutch, which rotates with the reel and shaft while winding in.

The braking mechanism is actuated by a brake wheel on the outside of the casing and acts on the reel gradually, preventing its stopping suddenly with the consequent loss of the wire and lead. There is an indicator on the case near the brake wheel showing which way to turn it to free the reel and let out the wire, or to brake the reel for winding.

Although normally designed for operation by one-horsepower motor, the device is arranged so that it can be operated manually if desired. In this case, disconnecting the motor from the gearing is unnecessary, as the motor armature acts as a flywheel. The outfit is so constructed that all parts are easily accessible for inspection or repairs. It is so simple that it can be satisfactorily operated at night by inexperienced hands.—*Nautical Gazette*, 11 February, 1922.

THE AMATEUR TRANSATLANTIC TESTS.—Amateur operators sent radio messages from this country to Scotland during the recent test which were reported as strong and steady by the representative of the American Radio Relay League, which was in Scotland to receive the signals. The transmitting sets were limited to a rating of 1 kw. maximum and to a wave length of 200 meters. This in contrast with the commercial transmitters rated at 100 kw. to 1,000 kw., or over, using long wave lengths. According to reports received by the Radio Corporation of America, all of the successful senders employed vacuum tube transmitters. Nearly all the messages received in Scotland were sent from New England and New York State.—*Scientific American*, March, 1922.

RADIO EQUIPMENT OF HUGE AIRPLANE.—There has been installed on the huge Goliath biplanes engaged in the Paris-London aerial service a combined radio telephone and telegraph equipment of 35 watts antenna output, with a sending range of about 180 miles at 900 meters' wave length. The complete radio equipment, according to *Radioelectricite*, weighs only 125 pounds. An air-propeller-driven generator for six volts and 700 volts and a 6-volt storage battery supply the necessary current. A 3-bulb amplifier is used for receiving on all wave lengths between 300 meters and 1,000 meters.—*Scientific American*, March, 1922.

ORDNANCE

CATERPILLAR ORDNANCE.—The United States Army is working toward the elimination of the horse and as a consequence three new types of motor equipment have recently appeared, sponsored by the Ordnance Department. These are a three-ton artillery tractor of unusual ability, a tractor mounting a 75-millimeter gun, and an eight-wheeled tractor carrying a 155-millimeter gun. At the present time only the 75-millimeter vehicle is waterproof, so that it can ford streams, but later on it is intended that all machines shall have this ability.

The three-ton artillery tractor was designed to take the place of the six-horse artillery team for hauling light artillery at speeds corresponding to the gallop of a horse. It has an unusual spring suspension and is particularly well adapted to ride through sand, marsh, and rough country without slackening speed.

The creeper belts are so sprung that they will follow the contour of uneven ground in much the same fashion that a snake does it. The lower side of the belt is forced into contact with the ground through the agency of four rollers, each pair of which is connected to one end of a cantilever spring. These springs are pivoted to the frame. Their other ends are linked to four rollers bearing against the upper side of the belt. This construction causes the lower side of the belt to follow the contour of the ground and at the same time keeps the belt taut regardless of the contour. It is interesting to compare this with the rope suspension described by Mr. Rowlinson for gaining the same end.

The problem of building a satisfactory self-propelled gun mount seems to have been pretty well solved by the type, which was developed by the Ordnance Department. One of the most serious difficulties has been that of keeping the weight down to a point where road bridges would carry the load. Another is the problem of wheel drive for roads and creeper drive for cross-country. Considering that the gun has a bore of somewhat more than five inches it is remarkable that the total weight of the vehicle is only 22 tons, the gun itself 6 tons.

It is propelled by a 120-horsepower six-cylinder engine, driving through a four-speed gearset. Wheels are driven through internal gears. When the track is removed the middle wheels are drawn up out of the way by a hand crank arrangement.—*Scientific American*, March, 1922.

A NEW FRENCH GUN.—Experiments with the new gun device, the invention of a French artillery officer, the feature of which is the high initial velocity of projectile which can be attained, are to be carried out at Liége. It is reported that in preliminary trials an initial velocity was attained with the famous French "75" of 850 m., whereas the normal figure is only 530 m. It is anticipated that in the Liége trials a velocity of 1,000 m. may be reached. Eminent artillerists are expected to be present at Liége next week, which has been provisionally fixed for the tests by the Belgian Government.—*The Engineer*, 27 January, 1922.

ARMOUR-PIERCING SHELL.—Little as the public hears about it, gunnery training in the post-war Navy is conducted on lines which leave nothing to be desired from the point of view of scientific thoroughness. The methods of 1916 have been revolutionized. The standard of accuracy at all practicable ganges is considerably higher now than then, and improvement is continuous. It is gratifying to know that if our battle fleet is ever again called upon to measure its strength against an adversary there will be no fear of its shooting prowess being stultified by defective ammunition. Our present projectiles are of the highest efficiency. Even before the end of the war a new and very effective type of A. P. shell had superseded the Jutland pattern, and since then this class of projectile has been developed to a wonderful pitch of perfection. Some instructive details appear in the latest issue of *Brassey*.. Previous to the war our manufacturers received scarcely any official encouragement to persevere in their attempts to solve the problem of oblique attack. Although as early as 1913 one firm had produced a shell which would penetrate at angles up to 15 degrees, the Admiralty could not be induced to take it up.

Subsequent events overcame official conservation, however, with the result that our latest projectiles have a good chance of holing thick armor plate even when the angle of impact is as much as 30 degrees. *Brassey* reproduces illustrations of shell which have actually performed this feat, and then been recovered intact and in a condition for bursting. It remarks that in 1920 the armor of most modern warships was perforable by contemporary projectiles at 30 degrees with velocities approximating to those which would remain with the projectile at battle ranges. While declining to prophesy as to the future, the same authority notes that our leading armament firms are prepared to construct guns of 18 inch and even 21 inch bore, and to provide A. P. projectiles of these calibers. Messrs. Hadfields have already built a 21 inch shell, which weighs 2½ tons, and if fired with a muzzle energy of 250,000 foot tons, would be capable of perforating 24 inches of hard-surfaced armor at a range of over ten miles. But, it is added, "the size of the vessel to carry such weapons is prohibitive, since facilities for docking and repair are barely adequate for the present-day leviathans. Moreover, with the menace of submarine and aircraft development, the direction of the evolution of the future battleship is still uncertain."—*Naval and Military Record*, 1 February, 1922.

MISCELLANEOUS

MEXICAN HARBOR DEVELOPMENTS.—Harbor improvements costing approximately $6,000,000 at the ports of Guaymas on the Gulf of California and Manzanillo on the Pacific Coast have been authorized by President Obregon of Mexico. Work at Manzanillo, which will entail an expenditure of $5,000,000, is a resumption of the port development started in 1908 by Edgar K. Smoot, an American Engineer, but halted by the revolutions from 1910 to 1920.

At Guaymas, the most important of the Pacific Coast ports of Mexico, $1,000,000 will be expended on a floating dry-dock, marine railway, and repair yards for ships. Although owned and operated by the Federal Government, the dry-dock, which will accommodate ships up to 5,000 tons, will be available for work on privately owned vessels.—*Nautical Gazette*, 25 February, 1922.

SHACKLETON'S GRAVE.—In deference to what, it is believed, would have been the dead explorer's own desire, Lady Shackelton has decided that Sir Ernest Shackleton's body shall not be brought home for burial as originally proposed, but taken from Montevideo, Uruguay, where it now lies, to South Georgia, and interred on the island.

Sir Ernest left no definite instructions as to his final resting-place, but his nearest relations and friends feel that it would be entirely in accordance with his desire that he should be laid to rest at the gate of the Antarctic and the scene of his greatest exploit. In 1916, after the loss of the *Endurance* in the Antarctic pack, Shackleton with two companions, made a voyage of 800 miles in a small open boat to South Georgia, reaching Grytviken in the last stages of exhaustion. Here he obtained help to rescue his comrades of the *Endurance* on Elephant Island, another desolate Antarctic island.

The site of Sir Ernest Shackleton's grave in South Georgia will probably be at the English church at Grytviken.—*Naval and Military Record*, 8 February, 1922.

AIRMEN BOMBARD MOORS.—Spanish aviators in Morocco have destroyed numerous native settlements of the Beni-Said tribe. This resulted in the chieftains sending a delegation to the Spanish military authorities pleading for a cessation in the bombardment and offering to submit to the Spaniards.

Aviators are preparing to bombard another center of concentration. In the course of the morning it was reported that a number of the most recalcitrant chieftains had gathered there with their followers.— *Aerial Age Weekly*, 13 February, 1922.

ICE BREAKERS AT TIENTSIN.—The Chinese Maritime Customs at Tientsin has made it possible for all steamers sailing to the northern port during the winter to go direct instead of around Zing Waung Tao to Tai Koo Kao, by installing ice-breakers. A toll is charged each steamer.—*Engineering*, 20 January, 1922.

CURRENT NAVAL AND PROFESSIONAL PAPERS

Naval Efficiency and Economy—*The Nineteenth Century*, February 1922.

Jutland and the Principles of War (Translated from "Revue Maratime")—*Journal of the Royal Institution*, February, 1922.

The Evasions of Washington—*Fortnightly Review*, February, 1922.

Fogs and Clouds—*Journal of the Franklin Institute*, February, 1922.

Methods of Air Navigation—*Aviation*, 27 February, 1922.

Notes on Ship-building Methods—*Engineering and Industrial Management*, 16 February, 1922.

Effects of Sulphur in Fuel Oil—*Power*, 10 January, 1922.

A Solution of the Principal Interior Ballistic Problem for Long Elliptic Cords—*Journal of the Royal Artillery*, February, 1922.

Electric Auxiliaries on the Merchant Ship—*The Marine Engineer and Naval Architect*, 16 February, 1922.

Radio for Everybody—*Scientific American*, March, 1922.

The World's Mercantile Shipping in 1921—*The Shipbuilder*, February, 1922.

NOTES ON INTERNATIONAL AFFAIRS

FROM FEBRUARY 5 TO MARCH 5

PREPARED BY

ALLAN WESTCOTT, Professor, U. S. Naval Academy

UNITED STATES

TREATIES SUBMITTED TO SENATE.—Appearing in person before the Senate on February 10, President Harding submitted the seven treaties resulting from the Conference on Limitation of Armaments. The President's speech closed as follows:

> Frankly, Senators, if nations may not safely agree to respect each other's rights and may not agree to confer if one party to the compact threatens trespass or may not agree to advise if one party to the pact is threatened by an outside power, then all concerted efforts to tranquilize the world and stabilize peace must be flung to the winds. Either these treaties must have your cordial sanction or every proclaimed desire to promote peace and prevent war becomes a hollow mockery.
>
> Your Government encouraged and has signed the compact which it had much to do in fashioning. If to these understandings for peace, if to these advanced expressions of the conscience of leading powers, if to these concords to guard against conflict and lift the burdens of armament, if to all these the Senate will not advise consent, then it will be futile to try again.

REPORTED OUT OF COMMITTEE.—On February 25, the Senate Foreign Relations Committee reported favorably to the Senate all the treaties growing out of the Conference, with the exception of the two Chinese agreements. The only modification proposed was the Brandagee reservation attached to the Four Power Pacific Treaty. With this reservation the treaty was later ratified. The reservation follows:

> The United States understands that under the statement in the preamble, or under the terms of this treaty, there is no commitment to armed force, no alliance, no obligation to join in any defense.

YAP TREATY RATIFIED.—By a vote of 67 to 22 the Senate approved without reservations the agreement with Japan relating to the island of Yap. There was an adverse vote on a proposed amendment providing that the United States should be sole judge whether or not the Japanese Government maintained radio communication on the island in accordance with treaty provisions.

BRITISH AMERICAN OIL AGREEMENT.—

After several months of negotiations, British and American oil interests have reached a basis of agreement on their conflicting claims to the virgin oil fields in the five northern provinces of Persia—to which the Standard Oil Company of New Jersey received a concession several months ago—and will form a new joint British and American company for equal participation in the development of the fields. It is learned that only the details of the agreement await settlement.

Sir John Cadman, technical adviser to the Anglo-Persian Oil Company and chairman of the Inter-Allied Petroleum Commission during the war, returned to England a few days ago after representing his company in the prolonged negotiations over the claim to the undeveloped oil fields.

In these conferences, which have been going on since December, the Persian Government was represnted by W. Morgan Shuster, fiscal agent in this country, and by Mirza Hussein Khan Alai, the Persian Minister. The Standard Oil Company of New Jersey was represented by A. C. Bedford, chairman of the board; E. J. Sadler of the directorate, and other officers of the company.

The five provinces covered by this contested concession are Mazanderan, Ghilan, Azerbaijan, Azrabad, and Khorassan, covering several hundred thousand square miles in the northern section of the country. The British company has been operating its oil fields in the southern part of the country for many years and a few years ago bought up the northern concession from a native of Georgia, whose claim, however, had not been ratified by the Persian Parliament. The Standard Oil's more recent concession was ratified by the Parliament. No company has undertaken development there.

"While Northern Persia is entirely wildcat territory, no wells having been drilled there, geologists who have examined the country say the northern provinces are underlaid by the same clear sand which is so prolific in Southern Persia," says *The National Petroleum News*. "Also, there are seepages of oil at various places in the northern provinces, so it is regarded as highly probable that oil resources as valuable as those in the southern part of the country will be developed in the north.

New York Times, 25 February, 1922.

PLANS FOR EUROPEAN SETTLEMENT

PREMIERS MEET AT BOULOGNE.—On February 25, Premiers Lloyd George and Poincaré held a brief but very successful conference at Boulogne, clearing away many difficulties in Anglo-French relations. Among other things it was decided that there should be a conference of foreign ministers on the Near Eastern question at Paris during the second week in March, and at the same time another in London on plans for the economic conference at Genoa. Further decisions are given below.

ANGLO-FRENCH ALLIANCE.—After the Boulogne Conference Premier Lloyd George declared that the terms of the proposed Anglo-French Alliance were practically settled and that the agreement would be signed before the meeting at Genoa.

It is understood that the treaty of guarantee by which England pledges herself to come immediately to France's aid in case of unprovoked attack by Germany and to support France in enforcing German disarmament

will run for twenty years instead of ten, as originally proposed, and that there is in addition the important change that England and France pledge themselves to act in accord in case of trouble on the eastern frontier of Germany. This, of course, means that England and France promise to protect Poland against attack by Germany—a considerable victory gained by France for her protégé.

Doubling the term of the treaty naturally adds to its value for France. It now bears a strong resemblance to the proposed three-cornered agreement among France, England, and America which was never ratified, except that there is a time limit.

From the world-wide standpoint the alliance grows in importance from the circumstance that France and England cannot act together with regard to Germany without being in accord on other international questions affecting them. It is not to be expected that the two nations will be in perfect harmony on the Rhine and in discord at the Dardanelles. Conclusion of the alliance will justify the hope that the two big allies will at last find a common policy on reparations and in Asia Minor.

America has an interest in the Franco-British Alliance. It has been the case ever since the Paris Peace Conference that with England and France as rivals, America's entrance into world politics on a real scale meant that she would hold the balance of power. The close partnership between England and France changes that and puts us on a different footing.

It is not to be supposed that the new alliance will bring unmitigated joy to every Englishman or Frenchman who breathes the breath of life. Not at all. It is a partnership of many difficulties inherent from centuries of political rivalry. It is a partnership which has been decided upon as the next best thing to an association of the Allies and the United States to restore world stability. America made impossible the first choice of England and France. They now turn to the second-best choice.

New York Times, 27 February, 1922.

GENOA CONFERENCE POSTPONED.—At the Boulogne meeting the Entente Premiers agreed that the date of the Genoa Conference should be postponed until April 10, with the possibility of further postponement.

Early in February Premier Poincaré sent a note to Great Britain calling for a strict definition of the agenda of the proposed conference, insisting especially that each nation taking part should definitely accept the conditions laid down in the invitation; that there should be no attempt to alter the Versailles Treaty; that recognition of foreign rights and rights of private property on the part of the Soviet Government should precede recognition; and that the Genoa Conference should be postponed. The decisions on these points reached at Boulogne are summarized as follows:

As it stands the result is chiefly negative. The peace treaties signed in France are not to be brought into question. A revision of the Versailles Treaty and other treaties negotiated by the entente powers is thus ruled out, but the various treaties of Poland, the Baltic States, and Russia are not considered binding by those who did not participate in their negotiation. The reparations question is also not to be disturbed. It will be left to the reparations commission, probably after the meeting of finance ministers at Paris. The League of Nations will be associated with the Conference. This means that the disarmament question will

be left to the League. Experts will examine technical matters at London and the Genoa Conference is provisionally fixed for April 10.

Another negation is that participation of the Bolsheviki in the Conference will not imply immediate recognition of the Russian Government. It is understood that the Russian war debt will be set aside. Particularly would it be absurd to place the burden of the Koltchak and Denikin campaigns, which were financed by the western powers, to the account of Russia.

M. Poincaré obtained a definition of the engagement to abstain from aggression. It does not mean that coercion cannot be employed against Germany.

SMALL STATES AT GENOA.—In negotiations with Great Britain over the Genoa Conference, France made the proposal that Jugo-Slavia and other small states of Central Europe should be included in preliminary discussions. While England did not consent to this suggestion, it is evident that the smaller states will play an influential part in any general economic settlement at Genoa. Tzecho-Slovakia, under the strong leadership of President Masaryk and Foreign Minister Benesh, is supported not only by the "Little Entente" alliance with Rumania and Jugo-Slavia, but also by the Polish-Tzech accord of November, 1921, and the recent Austro-Tzech economic treaty. Furthermore, the proposed conference on March 12 of the foreign ministers of Poland, Latvia, Esthonia, and Finland may bring the Baltic States into this combination to promote the common interests of the small powers. Only Hungary and Lithuania are excluded.

Such a combination, however, is likely to serve its own interests primarily, rather than those of France or the Western Powers. Nor can it lead to a general Danube Confederation, in view of the exclusion of Hungary, and its fundamental purpose of mutual defense against Magyars, Germans, and Russians.

REPARATIONS AGREEMENT.—At the Boulogne Conference it was agreed that the question of German reparation payments should be referred back to the Reparations Commission. On February 28, the Commission reached an agreement with Germany, subject to ratification by the powers concerned, in accordance with which Germany will pay this year a total of 720,000,000 gold marks in cash and 1,450,000,000 gold marks in kind.

While this arrangement was not accepted with enthusiasm in Germany, the Government on February 15 nevertheless secured in the Reichstag an open victory over the Junker opposition led by Hugo Stinnes. On that date the Reichstag by a vote of 230 to 185 upheld the Government in its firm measures for suppression of the general strike.

LIMITATION OF ARMAMENTS

PLANS FOR TEN YEAR TRUCE.—Prior to the Boulogne Conference, the European press announced that Premier Lloyd George had "a great plan"

for a ten-year truce throughout Europe, based on an agreement of European nations to respect each other's frontiers, abstain from aggression, reduce land armaments, and devote themselves to economic reconstruction. What resulted at Boulogne was apparently a decision to leave the question of reduction of land armaments to the machinery of the League of Nations.

The League of Nations Commission on Disarmament met in Paris during the third week of February. It was decided that the commission should continue work on a schedule of military requirements of league members for defense and colonial needs, should meet again on July 15, and then prepare draft proposals for land disarmament to be submitted to the League Assembly in September.

It was decided that the best method of approaching the question of national control of the manufacture of arms and munitions would be to suggest to league members ratification of the Convention of St. Germain on this subject. The questions of noxious gases in warfare and revision of international law were left to await detailed reports of the work done at the Washington Conference.

OPENING OF WORLD COURT.—The formal opening of the Permanent Court of International Justice at the Peace Palace in The Hague on February 15 was attended by Queen Wilhelmina and a large assemblage of diplomats. Dr. Gaston da Cunha, the only representative of the Council of the League of Nations present, pointed out that, whereas all previous efforts to establish such a court had failed, the existence of the League had made it possible. Dr. B. C. T. Loder, president of the Court, spoke of the appropriateness of Holland as the seat for the court, in view of its past history and devotion to international law.

GREAT BRITAIN AND IRELAND

IRISH ELECTION POSTPONED.—At a meeting of the Ard Fheis, or Sinn Fein National Convention, on February 21, a compromise was reached between the factions for and against the Anglo-Irish Agreement, providing:

(1) That the Convention should adjourn for three months and that no elections should be held in the meantime.

(2) That the Dail Eireann should continue to meet regularly in the interval, but that no division should be regarded as a party vote requiring the resignation of the Provisional Government.

(3) That when an election was held, both the Anglo-Irish Agreement and the Constitution for the Irish Free State should be presented to the voters at the same time for their approval.

This compromise in some degree jeopardized the Agreement, since it put the drawing up of the Constitution into the hands of the Sinn Fein, and gave opportunity to opponents of the Agreement to organize their attack. A vote in the Dail on February 28 gave the Collins-Griffith party the narrow majority of 56 to 50.

Following the Irish decision to delay ratification, Irish and English Cabinet members held a conference in London on February 26. It was decided that, in spite of the delay, the British Government should proceed with consideration of the Agreement in the House of Commons. Efforts were made and defeated in House committees to amend Article XII of the Agreement, relating to boundaries, so as to protect Ulster. Article XII provides that a commission of three members, one each for North and South Ireland and one appointed by the British Government, shall settle the boundary "according to the wishes of the inhabitants . . . so far as may be compatible with economic and geographic conditions." Mr. Winston Churchill declared that any attempt further to define or limit the scope of the commission would be certain to defeat the Agreement.

RIFTS IN COALITION GOVERNMENT.—Weakening of the Liberal-Unionist coalition which has so long supported the Lloyd George Government was emphasized during the first week of March by a letter from Premier Lloyd George to Unionist members of his Cabinet declaring his intention to resign unless he could be assured of unwavering support from the Unionist Party. "Die-Hards" in this party, led by Sir George Younger as head of the party organization, had opposed the Government's Irish policy and in general shown a tendency to break away from Lloyd George's leadership. On the other hand, the Premier by his letter indicated an inclination toward the creation of a new "center" party recruited from both Liberals and Conservatives and standing between extreme Tories and Radicals.

On March 4 Mr. Austin Chamberlain asserted the loyalty of Unionist cabinet members to the Premier so long as he was willing to lead the coalition.

STRONGER POLICY IN INDIA.—Speaking in Parliament on the situation in India, Premier Lloyd George explained the state of unrest there as a result of the spread of western liberal ideas throughout the East, in China as well as India, and declared that the practical application of these ideas would, as in China, "shatter the country into warring fragments." The present agitation in India is partly explained also by Mohammedan chagrin at the overthrow of Turkish power in the Near East. Establishment of Egyptian independence will in some measure satisfy Mohammedan interests, but is sure to be followed by similar demands for India.

In the meantime the Indian Nationalist Party decided in February to suspend temporarily their policy of civil disobedience.

MEASURES FOR EGYPTIAN INDEPENDENCE.—After waiting in vain for the establishment of a responsible ministry in Egypt, the British Government on February 28 issued a unilateral statement again declaring the basis

on which it was prepared to grant Egyptian independence. These terms were practically the same as in previous declarations:

First—Security of the communications of the British Empire in Egypt.
Second—Defense of Egypt against all foreign aggression or interference, direct or indirect.
Third—Protection of the foreign interests of Egypt and protection of minorities.
Fourth—We are prepared to make an agreement with the Egyptian Government in a spirit of mutual accommodation whenever a favorable opportunity arises for the conclusion of such an agreement. But until such an agreement satisfactory to ourselves and to the Egyptian Government has been concluded, the *status quo* will remain intact.

In his speech in Parliament Premier Lloyd George added that "foreign powers are not concerned, and we propose to state this unmistakably when the termination of the protectorate is notified by us."

On March 1 a new government was established in Egypt under the moderate Nationalist leader, Abdil Khalek Pasha, with the purpose of at once renewing negotiations for ending the protectorate.

ITALY AND SOUTHERN EUROPE

FACTA HEADS ITALIAN CABINET.—After a brief effort to carry on the Italian Government with a reorganized cabinet Premier Bonomi finally resigned on February 18. His successor was Luigi Facta, a former follower of Giolitti, who entered office on February 25 with a cabinet drawn from all constitutional groups except the Nationalists and Fascisti. While Facta is himself a Liberal, the Catholic party is even more predominant in this cabinet than in the one preceding.

FASCISTI CAPTURE FIUME.—On March 3, a band of Italian Fascisti temporarily gained control in Fiume by attacking the government headquarters with cannon and forcing the surrender of President Zanelli, head of the Fiume Free State. Hostilities between Croat and Italian factions in the city were renewed. An Italian cabinet member was sent to investigate the situation, in view of its threat to the friendly relations between Italy and Jugoslavia established by the Treaty of Rapallo.

POPE PIUS CROWNED.—Cardinal Ratti upon his election to the papacy took the name Pius XI, and on February 1 was crowned in St. Peter's as the two hundred sixty-first Pope.

KING STRENGTHENED IN SPANISH CRISIS.—A cabinet crisis in Spain was brought about at the close of January by the action of the War Minister in removing high military officers for public criticism of the conduct of military affairs. Upon the threat of the military juntas to eject the War Minister unless he resigned within forty-eight hours, the Cabinet appealed

to the King and later presented their resignations. The crisis ended with the restoration of the Cabinet, a strengthening of the King's prestige, and a blow at the power of the army juntas in Spanish politics.

NEAR EAST

FRENCH SUPPORT OF YOUNG TURKS.—Correspondence between the British and the French Governments over the Near Eastern question was published in the middle of February in a British White Paper. In this correspondence the British took the ground that the Angora Agreement constituted a direct violation of France's obligations to her allies by practically recognizing the Angora Government as sovereign in Turkey, and by surrendering to that Government territory which had been conquered by British troops and turned over to France only as a mandatory power under the supervision of the League of Nations. The French denied that the agreement constituted a recognition of the Nationalists, and conceded in principle that all agreements relating to Turkey should be subject to readjustment in a final settlement.

In the absence of Allied agreement upon a common policy in the Near East, it appeared probable that the Greek Government would evacuate Anatolia in the spring rather than face a renewed Turkish offensive backed by the support of France and Russia. A mission from the Angora Government to the Western powers left Constantinople on February 28, with a schedule of demands calling for almost complete restoration of Turkish control in Thrace and Asia Minor, including Allied evacuation of Constantinople and the Straits.

REVIEW OF BOOKS

SHIP NAMES OF THE UNITED STATES NAVY, THEIR MEANING AND ORIGIN, by. Robert W. Neeser; Moffat, Yard & Co., 30 Union Square, New York City.

Many a name borne by our vessels of war means nothing even to those reasonably familiar with our naval history, and Mr. Neeser has done a welcome work in setting down the traditions that these names perpetuate. The department has already taken the lead in this matter by setting up on each ship a name-plate containing the most important facts, but this book offers much more. Indeed, it includes ships no longer in existence and those which, on account of our naval reduction, never will exist.

There are, however, a number of seeming inaccuracies in fact and implication that might be cleared up in another edition. Mr. Neeser says that Columbus was born in Corsica. This is interesting, if true, but the encyclopedias still give Genoa. Beale is reported as having graduated from the Naval Academy in 1842, which is three years before the Academy was founded. Henley is described as the officer who "led Commodore Macdonough's squadron into action at the battle of Lake Champlain," but nobody led it into action because it was moored in line and merely awaited the attack of the British, who "led into action." Again, Blakely is spoken of as the man who "commanded the brig *Enterprise* in the second year of the war of 1812." This statement needs qualification because it was Burrows who commanded her in the famous action with the *Boxer* in September, 1913, after Blakely left her for the *Wasp*. It seems a curious omission, too, that in giving Buchanan's record the author should have left out the fact that he commanded the *Tennessee* when she engaged, single-handed, Farragut's entire fleet in Mobile Bay.

It is to be regretted that Mr. Neeser could not find room for a brief summary of the facts that have made a ship famous. These facts are far more significant for this volume than the history of a particular state or tribe of Indians that has given its name to a ship. And while in some cases he make the statement that so-and-so is the third ship to bear the name in our navy, in others he leaves the matter hanging by saying, "the first ship to bear this name was . . . " or "this ship name commemorates . . . ," etc. This is true of the *Serapis*, the *Insurgente*, the *Java*, and other prizes. Now the original *Java*, for instance, was blown up immediately after the action; was there another *Java* in our Navy, and when? The book ought to give these facts.

MAY 15 1922

Mr. Neeser's explanation of the origin of these ship names arouses question in some cases as to their fitness. Why should so many politicians who happened to be Secretary of the Navy have their names perpetuated on destroyers, especially the kind of Secretary that regarded the Navy as merely a grab-bag for his party? Some, perhaps, deserve to be remembered in the same company with Decatur, Hull, Perry, and Farragut, but they are few. And why should Maury and Mahan, the two men of the American Navy best known throughout the world, be assigned to light mine-layers, while somebody who happened to be washed overboard or killed in an accident on shore is immortalized by a destroyer? Doubtless whoever was responsible had reasons for the selection of every name, but they are not always apparent from Mr. Neeser's work.

W. O. S.